JULY, 1953

METAL FINISHING

DEVOTED EXCLUSIVELY TO METALLIC SURFACE TREATMENT
FOUNDED 1903

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METAL FINISHING

DEVOTED EXCLUSIVELY TO METALLIC SURFACE TREATMENTS

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WARNING To Our Readers

It has recently come to our attention that a man misrepresenting himself as our circulation agent is operating in Ohio and making collections from amongst our readers. We wish to advise all concerned that METAL FINISHING or FINISHING PUBLICATIONS, INC. has no field circulation man, and all matters pertaining to subscriptions to our publications should be sent directly by mail to our Westwood office.

JULY 1953 VOLUME 51 • NUMBER 7

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COMING SOON

The methods and equipment used for quality production in a small custom chromium plating plant in California.

A description of the many uses of porcelain enameled steel, a metal protective coating whose use and versatility are much more widespread than commonly recognized.

Pickling metal prior to subsequent finishing, and the use of inhibitors in the acid solutions used in descaling steel.

The evaluation of a new stripping solution for phosphate coatings which may be used for determination of the coating weights of all types of phosphate coatings.

Common forms of anodes used in copper, cadmium, zinc and nickel plating, and special points that apply to anodes in general.

ABLSHED 1903

TED EXCLUSIVELY TO METALLIC SURFACE TREATMENTS

METAL FINISHING

LUME 51 • NUMBER 7 • JULY 1953

Letter To A Plater

Dear Jeff:

So you've begun to notice it too! Yes, I've been aware of the trend for years. It began to dawn on me during the labor shortage days of World War II. As a plater, with chrome scars to prove it, it gave me an awfully funny feeling at first. I suppose you and I are like the old-time carriage makers viewing the progress in auto building back in 1910.

I agree that they are rather young, many of the men grabbing the good supervisory jobs in the finishing departments of large firms, and couldn't possibly have accumulated all the bits of information and know-how that go into the make-up of a good plater. If you mentioned Bower-Barff, they'd probably think you were barking at them and an ormolu finish would be familiar only to those who accompany their wives on a hunt for the antique clocks which are popular today.

Sure, there are lots of good platers like you in the unenvious position of having to take orders from a process engineer who wouldn't know a Flemish from an English bronze or what to do when the fields of a World generator reversed themselves and started deplating the work in the tanks. I'll bet there aren't even a dozen of the younger group who've ever seen one of those old World and Giant machines in operation, with their sparking brass gauze brushes. Frankly, I would never have broached the subject to you, except that you are asking for my advice, as an old friend. You've got to face it, Jeff. These fellows have studied and learned something that is paying off.

You were a plater for about ten years before we met and we've been friends for over twenty years now. Time sure does fly, doesn't it? During those many years, you took courses in chemical analysis and in electrochemistry to round out your training and you learned almost every trick in the book. I would consider you fully qualified to handle any plating problem and, if there is a finish possible, I know you can produce it. That is the commodity you have for sale — your accumulated experience. Unfortunately, too many large employers have no need for this commodity today.

Formulas aren't trade secrets any more and large firms have a laboratory to analyze solutions, run tests and calculate maintenance additions. Operating on a large-scale, scientific basis, they almost never run into problems in which your knowledge and experience would show to advantage. The problems are not technical so much as they are supervisory. That, Jeff, is where the younger man has you beat! He knows very little about finishing, but he doesn't have to know much. He does, however, know labor-management relations, incentives, record-keeping; he knows *foremanship,* and these are the acquirements that today have, and will continue to have, a high value to the large employer.

When these can be found, along with technical know-how, in the person of a single individual, that individual need never worry about his position of respect and authority in the plant. Therefore, my friend, it looks like you are in for another session of evening study, a plater learning to be a supervisor. But don't feel too bad about it. Just think of the supervisor who is studying the subject of metal finishing, and the task he has set for himself.

Sincerely yours,

Nathaniel Hall

Fortieth A.E.S. Convention Held at Philadelphia

CONGRATULATIONS and thanks are in order to *Dr. Samuel Heiman*, newly elected third vice-president, and his hard working committee for putting on a most successful annual convention during the week of June 15-18.

From all reports everyone was pleased with the general program, which was well attended. Total registration reached 1,362 exceeded only by the Chicago convention last year, which was accompanied by an exposition. An unusually large and record breaking number of ladies (390) were present and participated in the program arranged by *Mrs. Mary Robson* and the Ladies' Committee.

A popular innovation this year was an informal Sunday night get-together to start proceedings off for the early arrivals. The weatherman gave this convention his blessing and cool, sunny days prevailed from Sunday through Thursday.

At the opening session *Mr. J. Harry La Brum*, president of the Philadelphia Chamber of Commerce, spoke on "Tomorrow's Challenge in the Delaware Valley," and *Dr. William Blum* spoke about his recent trip to Australia with Mrs. Blum, touching on the highlights of the technical aspects of the industry and the cordial hospitality extended him by the people. He visited the three Australian Branches of the A.E.S., Sydney, Melbourne and Adelaide. *Earl Merriman*, who is connected with the *Lawrence Smith Co., Ltd.*, representing the Sydney, Australia Branch was introduced at the opening session.

President *Franklin J. MacStoker* presented the Paper Awards as follows: the *Carl E. Heussner* award to *William C. Geissman* and *Robert H. Carlson* for their paper, "Current Distribution in Barrel Plating — a Statistical Study"; the A.E.S. silver medal to *Ray F. Ledford* and *A. E. Dominik* for their paper, "Comparative Wear Characteristics of Some Electrodeposited Metals"; honorable mention award to *Stanley L. Eisler* for his paper, "Radioactive Isotope Dilution Method for Determining Sulfate Concentration in Chromium Plating Baths"; the chromium plating award to *Lloyd Gilbert, W. D. Morrison* and *F. H. Kahler* for their paper, "Use of Ion Exchange Resins in Purification of Chromic Acid Solutions"; and the precious metals plating award to *Harold J. Wiesner* for his paper, "Some Experiences in Heavy Rhodium Plating."

Considerable interest was shown in the branch finishes exhibits. First award in the individual entries went to the *Bell and Howell Company* of Chicago, and second for an interesting display of finishes in the Far East, assembled by *Ezra Blount* of the Cincinnati Branch. *Belmont Casket Company* of Columbus, Ohio took third place honors in the individual awards.

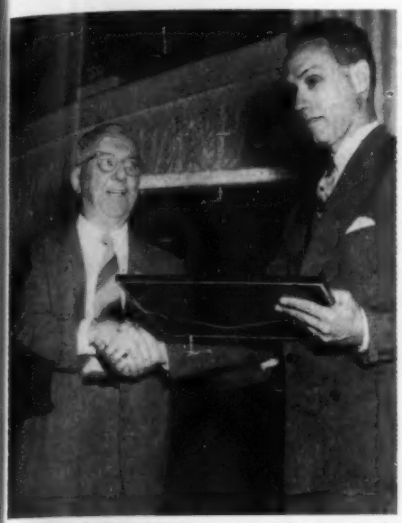
Dr. Samuel Heiman, general chairman and new 3rd vice-president.

A.E.S. officers at the opening session: F. J. MacStoker, Dr. Donald G. Foulke, Dr. G. P. Swift, Dr. R. A. Schaefer, Clyde Kelly, C. F. Nixon.

First place in the A.E.S. branch exhibits went to Columbus and second place to Boston.

Business Meeting and Election of Officers

Franklyn J. MacStoker presided over the Society's annual business meeting on the closing day. In former years it was customary at this time to select the convention city for the next year, which often resulted in some



President MacStoker presenting a paper award.

campaigning and roll call votes of the delegates. Nowadays, with all hotels booked months, and even years in advance, and with the conventions so large that only certain hotels can handle the group, this problem of selection is a committee task. The line-up of future conventions is as follows:

1954 — New York. Hotel Statler.
1955 — Cleveland (with an exposition).
1956 — Washington.
1957 — Montreal.

Of the larger groups, the New York Branch added the most new members during the year; Saginaw Valley of the intermediate, and Louisville of the smaller groups.

In reporting on the growth of the Society, *Dr. Ralph Shaeffer*, now first vice-president, showed statistics portraying the increase in organic finishing departments amongst member firms, and suggested that the editorial board give increased attention to this field.

Clyde Kelly, now second vice-president, announced the awards for the branch exhibits, elsewhere reported.

A proposal to amend the constitution so as to permit wider freedom in selecting dates for annual conventions was passed. This was the idea of *Charles Wise* of the Cincinnati Branch.

Dr. George P. Swift, now president, presented the budget for the new year, which was unanimously passed. It anticipates both increased income and increased expenses.

The Board has accepted the resignation of *Dr. Donald Foulke* as executive secretary, effective July 1. Several candidates are under consideration and pending the selection of a new secretary, *Walter Dietrich* will carry on the work of the Society's office.

A resolution to expand the field of the Society to include other arts and sciences related to plating was adopted, in line with the report of the membership committee and others.

A resolution to suggest to the Federal Government that the Bureau of Standards be set up as a separate agency not under the Secretary of Commerce, was adopted and unanimously passed.

A resolution was adopted to extend wishes for recovery to *George B. Hogaboom*, stricken with a heart attack on the closing day of the convention and confined to a Philadelphia hospital. (We are pleased to announce that as we go to press George is recovering nicely.)

New officers sworn into their posts by *Fred Fulforth* were as follows: President, *Dr. John P. Swift;* 1st vice-president, *Dr. Ralph Schaeffer;* 2nd vice-president, *Clyde Kelly;* 3rd vice-president, *Dr. Samuel Heiman.*

Mr. George Schore reported progress on the New York convention, to be held July 12-15, 1954 at the Hotel Statler.

M.F.S.A. Elects Officers

On the opening day, the *Metal Finishing Suppliers' Association* held their annual luncheon and business meeting. *John Gumm*, of the *Frederick Gumm Chemical Co.*, gave the report of the nominating committee for the new slate of officers, who were unanimously elected, as follows: President, *Al Braun* of *Braun Organics, Inc.*, Long Island City, N. Y.; 1st Vice-President, *Manson Glover, Glover Coatings Co.*,

Top, Left to Right: Dr. Blum presides over research meeting aboard Delaware Belle. George Swift, George Wagner, George Schore. George Hogaboom, Dr. Blum and Ed Musick enjoying open house. Lower, Left to Right: Ellsworth Candee and Walt Pinner. Art Logozzo of Nutmeg Chrome Plating. Doc Brenner, Bureau of Standards. Typical branch exhibit.

The registration desk was a busy place Monday morning.

Manson Glover and family from Boston.

Jack Haney, Charlie Berry and Maurice Caldwell enjoying a few hands at cards.

Mr. & Mrs. Gerry Lux with Joe Ruff.

Malden, Mass.; 2nd Vice-President, *Herman Struckhoff, Lasalco Mfg. Co.*, St. Louis, Mo.; 3rd Vice-President, *Joseph Duffy, Pennsylvania Salt Mfg. Co.*, Philadelphia, Pa.; Secretary, *A. P. Munning* of *Munning and Munning Co.*, Newark, N. J.; Treasurer, *Thomas A. Trumbour, Finishing Publications, Inc.*, Westwood, N. J.; and Trustees, *Charles Berry, Maas and Waldstein Co.*, Chicago, Ill.; *Earl Couch, Lea Mfg. Co.*, Waterbury, Conn.; and *Ray Ledford, Industrial Filter and Pump Mfg. Co.*, Chicago, Ill.

Charlie Berry, in the normal course of events, would have moved into the vice-presidency, but relinquished this post so that the elected officers would better represent the various divisions of the finishing industry.

Resolutions were adopted supporting the work of the A.E.S. to make for bigger and better conventions, with the financial burdens shared in the most equitable manner. Discussion of future plans followed the installation of the new officers.

PHILADELPHIA MEMORIES

By Joan T. Wiarda

The social activities at Philadelphia were at an all time high. *Dr. Samuel Heiman*, general chairman, and *Delmar R. Robson*, co-chairman, are certainly entitled to the A.E.S. praises. *Mrs. Delmar R. Robson* and her most capable committee are entitled to the A.E.S. orchids.

The Early Bird reception made a big hit. It was a wonderful get-together time for greeting old friends and making new ones.

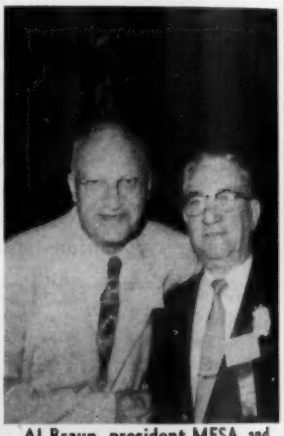
Monday afternoon the ladies were taken to the John Wanamaker store for tea and heard a very interesting talk by *Mrs. Reba Miller*, "Getting to Know Your Neighbors."

Monday evening was the usual I.F.C. Open House. Most of the "guys and dolls" attended the affair and certainly enjoyed the dining and dancing. Quoting the H.-V.W.-M. official convention news, "*Metal Finishing Suppliers' Association* deserves a rousing hand from every conventioneer for a thoroughly enjoyable evening."

Tuesday, *Oakite Products, Inc.* sponsored the Annual Aunt Ella Society Luncheon, and the ladies, as usual, enjoyed their host, *Dave X. Clarin*. It must be the "X" in his name that gives him all that "moxie" with the gals. After the luncheon the ladies went to the duPont Longwood Gardens.

Mrs. Franklin J. MacStoker.

Wilfred S. McKeon, a founder of the MFSA.

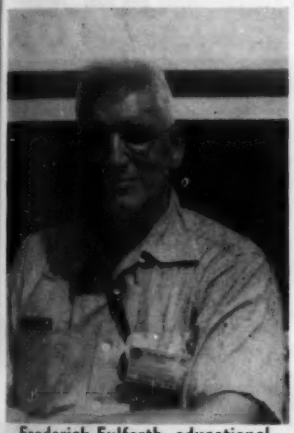


Al Braun, president MFSA, and Tom Trumbour.

Thelma Nisch, George Nankervis and Dolores Bundschuh.

Dick Crane addresses the ladies' educational session.

Dr. Harold Narcus and friend.



Frederick Fulforth, educational chairman.

Doc Kellner and trick worm tie.

The Annual Golf Tournament which is sponsored by the M.F.S.A., also held on Tuesday, was enjoyed by over 75 golfers, hackers and duffers.

George P. Zurenda, Industrial Service Corp., Elmira, N. Y. shot a 78. He was low gross winner. Low net honors went to *E. J. Mahar, Atlas Powder Co.*, Stamford, Conn., with 66.

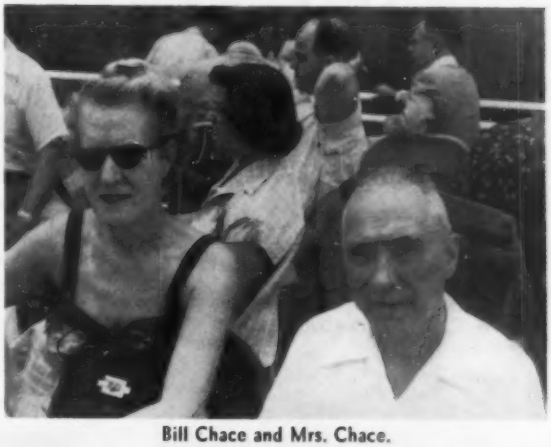
Hats off to *Joe Duffy*, Chairman, for another well planned day of golf.

Wednesday at noon the "Boys and Belles" boarded the "Delaware Belle" for a cruise down the Delaware River —as the H.-V.W.-M. news said, "nautical but nice." The boat trip was a terrific success. Everyone enjoyed the outing. The food was excellent and the music good. The Ladies Party was held on board, and as usual 345 women tried very hard for the awards. The *J. J. Siefen Co.* of Detroit, Mich., gave each lady a lovely Coro necklace, as well as a share in the "*His* and *Her*" watches—the lucky woman was *Mrs. Joseph H. Farmer*, Saginaw, Mich., and of course *Joe*, who is Division Supt. of *Lufkin Rule Co.*, was "Her lucky Him." *W. Green Electric Co.*, New York, N. Y. presented each lady with the traditional double deck of cards.

Thursday morning *Earl Couch*, president of *Lea Mfg. Co.*, Waterbury, Conn., and *Dick Crane*, vice-president, were the men of the day. The ladies loved it, even though they had to get up for the 9:30 A.M. breakfast call. Dick Crane conducted the Ladies Educational Session and they really tested the girls and learned, much to their surprise, that girls really know what their husbands are doing at the plant. Three teams were selected, *Mrs. Creamer* and *Mrs. Hill*, *Mrs. Cogan* and *Mrs. Maxim*, and *Mrs. Swift* and *Mrs. Wise*. The program was a take-off on the Groucho Marx TV program, and under the point system Mrs. Swift and Mrs. Hill were the winners. No one mentioned the secret word, which was bottle, selected, I believe, because of the constant use of bottles in labs and plants. The award for the secret word was a beautiful corsage (the flowers were lovely, but the four greenbacks with good old Abe Lincoln's picture made it very valuable). The Lea boys decided one of the girls should have it, and master *James Stanek*, son of *Belke's Ed Stanek*, drew the lucky name, *Mrs. Cogan*. If I hadn't lost my voice on Wednesday, I would

Mrs. Joseph H. Farmer receiving the award from John Siefen and Mrs. Siefen.

The platers aboard the Delaware Belle.



Bill Chace and Mrs. Chace.

Dr. Joe Kushner and Mrs. Kushner of the Kushner Electroplating School.

Hubert M. Goldman, Phillip Bruno, J. F. Buckman, Austin Fletcher, F. W. Kenyon, Arnold Rochman, D. R. Hartshorn, James A. Viola, John J. Martin, Frederick A. Infield.

Mr. & Mrs. Ben Sax

Mike Milo and T. R. Boggs, Norfolk and Western RR.

H. C. Irvin on the Delaware Belle.

Cyril Kocour of Chicago.

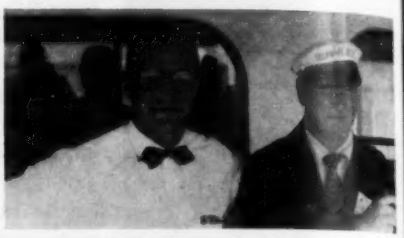
have made it exactly like Groucho's program — I would have asked Dick his age.

The *Hanson-Van Winkle-Munning Co.*, as usual, published the Official Convention News, and as we all know, it is a very pleasant eye opener to find the news of our A.E.S. convention under the door each morning (an excellent excuse to go back to bed and read it). Many loved ones will be framed in the very attractive Silver Lume plated picture frame given to each conventioneer by the Hanson-Van Winkle-Munning Co. The Hanson grand awards went to: Paul Glab, Mrs. Florence Morgan and Mrs. William Blum.

Chandeysson Electric Co., St. Louis, Mo. and *Heil Process Equipment Corp.*, Cleveland, Ohio, entertained their distributors late Monday afternoon at well planned affairs. The guests had window seats for the big Philadelphia Flag Day parade. *Sherman Goble*, host for *Federated Metals Div., American Smelting and Refining Co.*, entertained his distributors very royally Tuesday evening in the Franklin room, but Philadelphia double crossed him and didn't put on the parade.

Congratulations Philadelphia — you can be proud of your chairmen and their committees.

The "guess who picture" which appeared in the Convention Daily—our Mrs. Joan T. Wiarda.



Fred Wagner and friend.

The Belkes—father and son.

F. A. Infield and William O. Haylon of General Electric.

Harry L. Benner of Wilmington, Del.

Experimental Plating of Internal Engine Parts

By George W. Grupp, *Washington, D. C.*

ABOUT three years ago the Defense Department decided it should explore the possibilities of developing a single metal protective coating for the steel internal parts of aircraft engines. It wanted to know if it was possible to develop a single electroplated coating which would be easy and economical of application at moderate temperatures and would possess the mechanical protective qualities of baked resins, the electrolytic protective properties of cadmium or zinc, and the non-galling characteristics of copper, lead, silver or tin.

With this in mind the Defense Department authorized the Materials and Process Division, Aeronautical Engineering Group, Overhaul and Repair Department, United States Naval Air Station at Pensacola, Florida, to first make a series of experimental tests with steel plates to determine the most suitable alloy protective coatings.

Next the Division was authorized to experiment with these alloy protective coatings on the internal parts of over twenty different R-985, R-1340 and R-1830 models of aircraft engines.

These tests were unheralded; and only recently were some of the findings of these experiments made available.

First a study was made of the various suitable metals which are easy and economical to apply as electrodeposited coatings. Next, an inquiry was made into the possibilities of producing a coating of the desired properties by alloying one or more metals which are anodic to steel such as aluminum, cadmium, chromium, magnesium and zinc, with one or more non-galling metals such as copper, lead, silver and tin.

Aluminum and magnesium were rejected because of plating difficulties which would be encountered in their employment. Chromium was rejected because chromium alloys have a tendency to become passive or cathodic to steel.

Next, a study was made of the various systems of alloys such as zinc-silver; zinc-tin; copper-zinc-tin; copper-zinc-silver; copper-zinc-cadmium; and cadmium-tin.

Diffused Deposits

These alloy coatings were produced by diffusion of the individually deposited metals at low temperatures to experimental steel plates for the making of various tests.

The copper-zinc; copper-zinc-tin; copper-zinc-silver; copper-zinc-cadmium; and silver-tin alloy systems were found to have little or no possibilities as protective coatings with the desired properties.

Only the tin-zinc and cadmium-tin systems possessed the characteristics of the desired coating. And the cadmium-tin alloy coating was found to have superior qualities, since it gave greater protection to steel surfaces.

The cadmium-tin alloy coating can be easily applied to steel engine parts and the heat treatment at low temperatures does not produce injurious effects on the engine parts. It also provides the desired electrolytic and mechanical protection to steel surfaces. When cadmium and tin are applied separately they can be satisfactorily alloyed by diffusion in 30 minutes at temperatures from 329 to 333°F.

Based on the findings with experimental steel plates the next step was the application of cadmium-tin and zinc-tin coatings to such aircraft internal engine parts as bolts, crankshafts, cam tracks, gears, hub assemblies, nuts, pinions, springs, valves and cylinder walls.

Cylinder Wall Tests

Let us follow through one series of tests with cylinder walls. After the cylinder walls had been plated, the engines were placed in test stands and operated for eight continuous hours after which they were exposed to outdoor sea atmosphere at Pensacola for ten days with the engine heads up and the spark plug holes open. Untreated cylinder walls were covered with a film of rust over the entire surfaces. About 53 per cent of the total area was covered with a heavy film of rust. The results of the other cylinders, variously processed, were as follows:

A. *0.00015" Nickel + 0.00005" Zinc. Heat treated 15 minutes at 700°F. and air cooled.*

The area extending 4 inches from the edge of one skirt was rust free. The upper 5 inches of the cylinder was covered with an excessive solid coat of rust. About 44% of the total area was covered with a heavy film of rust. On a duplicate cylinder, the area extending 3.5 inches from the edge of the skirt was rust free. The upper 5.5 inches of the cylinder bore was covered with an excessively heavy coat of rust. About 53% of the total area was covered with a heavy film of rust.

B. *0.0001" Nickel + 0.0001" Zinc. Heat treated 15 minutes at 700°F. and air cooled.*

The area extending 2 inches from the edge of the skirt was rust free. The upper 7 inches of the cylinder bore was covered with an excessively heavy coat of rust. About 62% of the total area was covered with a heavy film of rust. On a duplicate cylinder, the area extending 4 inches from the edge of the skirt

was rust free, except 2 sq. in. of rust about 2.5 inches from the skirt. The upper 5 inches of the cylinder bore was covered with an excessively heavy coat of rust. About 53% of the total area was covered with a heavy film of rust.

C. *0.00015" Nickel + 0.00005" Zinc. Heat treated 15 minutes at 700°F. and air cooled. Followed by 0.0001" Tin.*

The area covering three-fourths of the circumference of the cylinder bore and extending from the cylinder head to between ½ and 1 inch from the edge of the skirt was rust free. In the remaining ¼ of the bore's circumference, an area extending 4 inches from the edge of the skirt was rust free. About 7% of the total area of this quarter section had a medium rust film and about 2.4% had a light rust film.

On a duplicate cylinder, the area covering half of the cylinder bore's circumference from the head to the edge of the skirt was rust free. The remaining half, an area extending 3.5 inches from the edge of the skirt was rust free. Only 28% of the total area of this second half was covered with a light film of rust.

D. *0.0001" Nickel + 0.0001" Zinc. Heat treated 15 minutes at 700°F. and air cooled. Followed by 0.0001" Tin.*

The area extending 4 inches from the edge of the skirt was rust free. The upper 5 inches of the cylinder was covered with an excessively heavy coat of rust. About 44% of the total area was covered with a heavy film of rust. On a duplicate cylinder, practically identical results were obtained.

E. *0.00005" Cadmium + 0.00015" Tin. Heat treated 15 minutes at 330°F. and air cooled.*

The area extending 7 inches from the edge of the skirt was rust free. The upper 2 inches of the cylinder was covered with a light rust film. In the area below the compression ring travel, a significant amount of the plating was present. About 18% of the total area was covered with a light film of rust.

On a duplicate cylinder, the area extending 5 inches from the edge of the skirt was rust free. In the area 5 to 6.5 inches from the edge of the skirt there was a scattering of light rust bands. In the upper 2.5 inches of the cylinder bore, light, isolated rust was found. About 19% of the total area was covered with light rust.

F. *0.00005" Cadmium + 0.00015" Tin. Heat treated 15 minutes at 330°F. and air cooled. Followed by 0.0001" Tin.*

The area extending 4 inches from the edge of the skirt was rust free. At a point 5 inches from the edge there was a ¾ inch wide light rust band which extended halfway around the circumference of the cylinder bore. In the head and area of the cylinder, some light rust was found. About 9% of the total area had a light film of rust and 12% had a faint rust film.

On a duplicate cylinder, about ⅔ of the bore area extending 8.5 inches from the edge of the skirt was rust free. The remaining ⅓ of the cylinder bore area, extending 4 inches from the edge of the skirt, was also rust free except for a 2 inch wide band showing a medium amount of rust. Some light rust was found in the head end area. About 9% of the total area was covered with a light film of rust and another 9% of the total area showed a faint film of rust.

Table I outlines the procedures followed to produce the various finishes applied for the tests.

Table I.

Preparation, Plating and Post Treatment Sequence

Step	Operation	Type and Thickness of Deposit: Cd-Sn 0.0001"	Cd 0.0001"	Sn 0.0002"	Pb 0.0002"	Cr 0.004-0.006"
1.	Degrease	x	x	x	x	x
2.	Electroclean (anodic)	x	x	x		
3.	Water rinse	x	x	x	x	
4.	Stop-off	x	x	x	x	x
5.	Pumice Scrub	x	x	x	x	x
6.	Water rinse	x	x	x	x	x
7.	Acid dip (inhibitor added)	x	x	x	x	
8.	Water rinse	x	x	x	x	
9.	Cyanide dip	x	x			
10.	Anodic etch					15 min.; 2 amp./in.^{2}
11.	Water rinse			x		
12.	Plate	Cadmium 0.000025"	x	x	Copper Flash	x
13.	Water rinse	x	x	x	x	x
14.	Plate	Tin 0.000075"			x	
15.	Water rinse	x			x	
16.	Bake	30 minutes 330-340°F				3 hours; 375°F.

NOTE: When the parts were acid dipped for a longer period than 30 seconds they were baked for 3 hours at 375°F.

Table II.

Comparison of Hand and Automatic Sequence

HAND OPERATION

1. Vapor degrees (trichlorethylene)
2. Remove carbon (cold C-86 stripper)
3. Water rinse
4. Vapor blast (1250 grit)
5. Dip in preservative oil (75% 1120 oil, 25% AN-VV-576A)
6. Rack
7. Vapor degrease (trichlorethylene)
8. Electro clean (anodic)
9. Water rinse
10. Acid dip (5-10 seconds)
11. Water rinse
12. Cyanide dip
13. Tin plate (25 amp./ft.^{2}, 160 seconds)
14. Water rinse
15. Cadmium plate (25 amp./ft.^{2}, 84 seconds)
16. Water rinse and dry
17. Bake 30 minutes, 330°F.

AUTOMATIC UNIT

1. Vapor degrease (trichlorethylene)
2. Diphase soak (Note 1.)
3. Spray wash (kerosene, 115°F., conveyor)
4. Spray wash (water, conveyor)
5. Spray wash (kerosene, room temp., conveyor)
6. Brush lightly if necessary
7. Rust preventive oil
8. Inspect and repair if necessary
9. Vapor degrease (trichlorethylene)
10. Mask bearing areas and bushings
11. Vapor blast (50/50 Novaculite abrasive, 100 and 200 mesh)
12. Remove masking and remask bearing areas
13. Water rinse
14. Spray rinse
15. Electroclean (anodic)
16. Water rinse
17. Spray rinse
18. Acid dip (10% by vol. sulfuric acid, 70 seconds)
19. Water rinse
20. Spray rinse
21. Tin plate (25 amp./ft.^{2}, 205 seconds. Note 2.)
22. Water rinse
23. Spray rinse
24. Cadmium plate (25 amp./ft.^{2}, 114 sec. Note 3.)
25. Water rinse.
26. Spray rinse
27. Hot rinse
28. Blow off with compressed air
29. Remove masking material
30. Bake 40 minutes, 340-345°F.

Note 1.

MIL-C-5546 compound	20 by volume
Trichlorethylene	30 "
Kerosene	35 "
Water	15 "

Note 2.

Sodium stannate	16 oz./gal.
Sodium hydroxide	1 "
Sodium acetate	2 "
100 vol. hydrogen peroxide	1.6 ml./gal.
Temp.	160-170°F.

Note 3.

Cadmium oxide	3- 4 oz./gal.
Sodium cyanide	9-12 "
Sodium hydroxide	1- 2 "
Brightener as required	
Ratio total cyanide to cadmium	3.75:1 to 4:1
Temp.	70-90°F.

Endurance Tests

Now let us turn our attention to the endurance tests of 150 hours and 500 hours made with two overhauled R-1830 engines.

After these engines' internal parts had been plated, they were placed in test stands and operated continuously for 150 hours. Next, they were cleaned with kerosene. Then, such parts as crankshafts, nose section gears, and piston pins were examined for evidence of galling or other injurious effects. None were found. The plating indicated no evidence of flaking or peeling but did show evidence of wear on moving contact parts such as gear teeth.

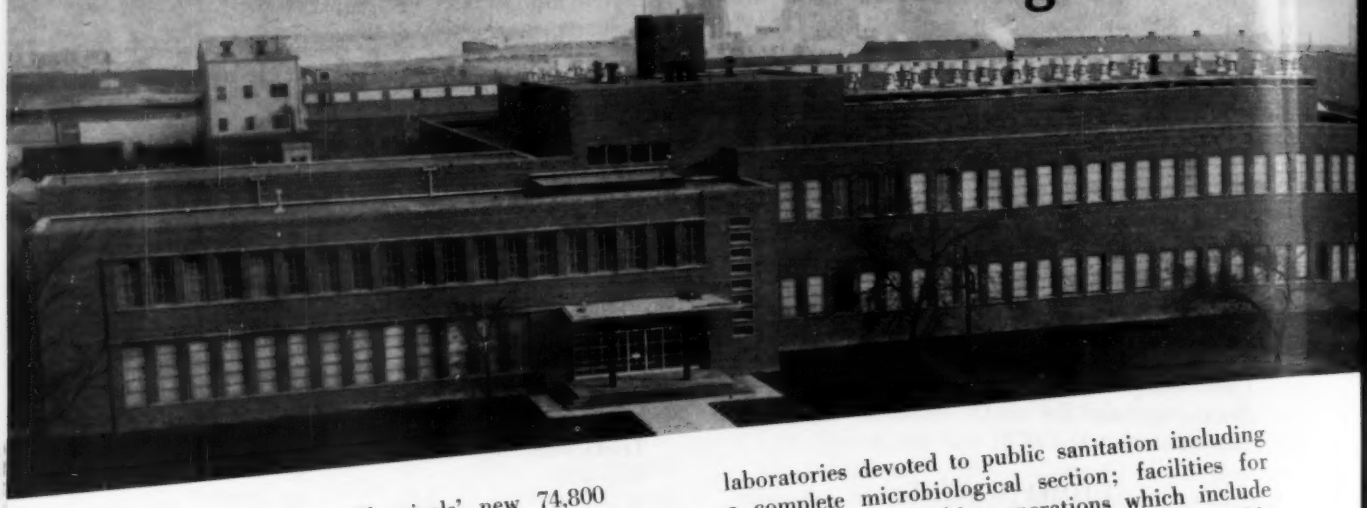
Following this examination, the same two engines were given an additional 350 hours of continuous operation in the test stands. Inspection after a total of 500 hours of operation revealed that cadmium-tin alloy plated surfaces were still in good condition except those parts which were in constant wearing contact, such as gear teeth and cam tracks.

In other tests it was learned that it required only one ounce of cadmium and one ounce of tin to coat all the steel internal parts of ten R-1340 engines, or a combined weight of six grams of cadmium and tin per engine.

During the test period the old style equipment of the plating shop at the Pensacola United States Naval Air Station was replaced with automatic equipment which proved to be highly satisfactory. The sequence of operations of the two methods is shown in Table II. With the automatic equipment it required only 8 man-hours of direct labor to perform operations 9 through 30, with the automatic equipment plating and baking all internal parts of each engine.

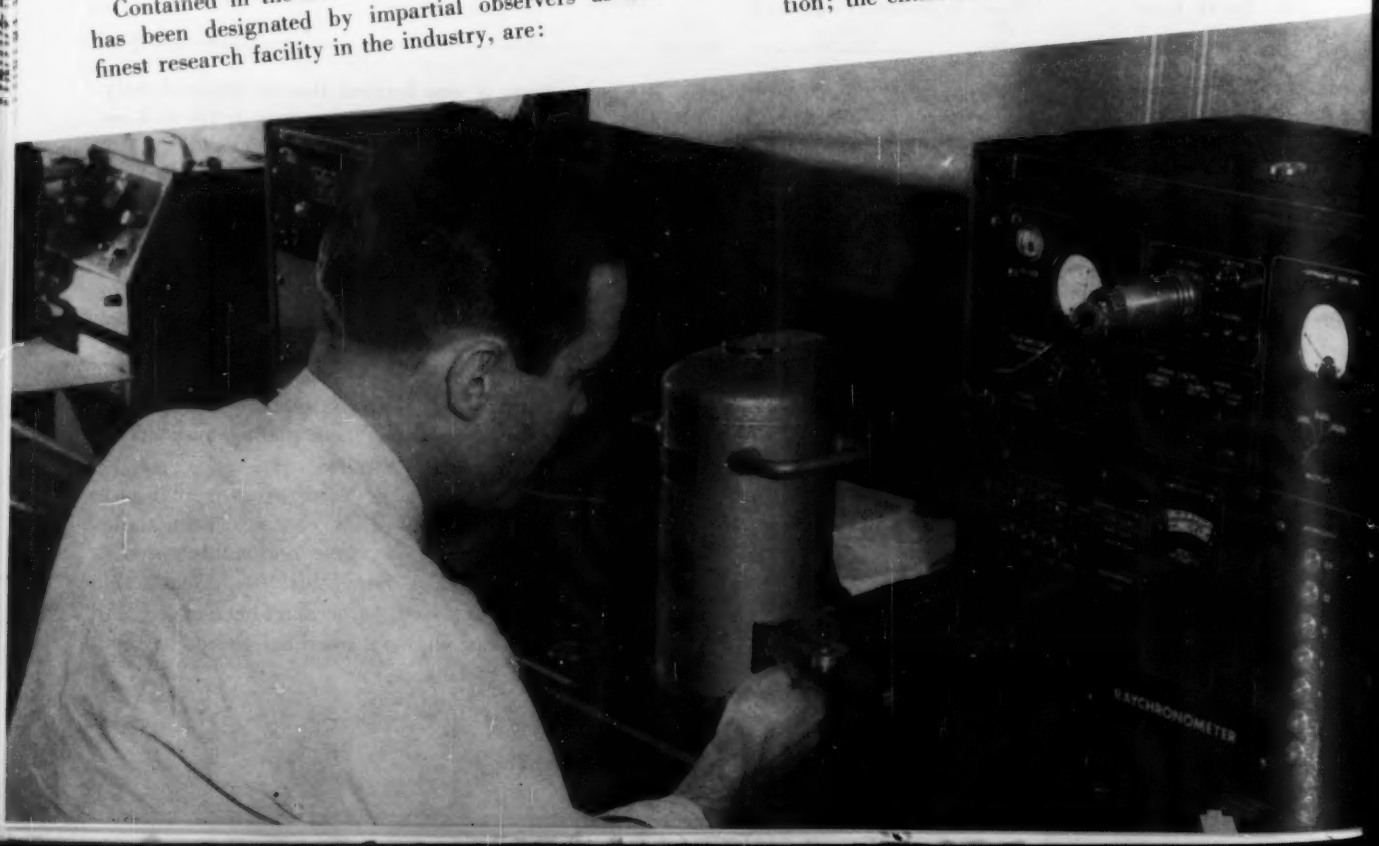
The overall conclusion of these experimental tests indicate that cadmium-tin alloy coatings, even under severe operating conditions, give reasonably satisfactory results. It was also found that, with reasonable care, cadmium-tin plated parts may be cleaned and handled during an engine's overhaul period without damage to the coating.

Wyandotte Chemicals Opens New Research Laboratories Building



OPENING of Wyandotte Chemicals' new 74,800 square foot research laboratories building fulfilled President *Robert B. Semple's* instructions in every regard. "No ceremony, no ribbon cutting, move in as quickly as possible and keep on working," were the directions issued by the head of the corporation when the first of the new research laboratories was ready last January. The new laboratories building was completely occupied in late May, and with a few very minor exceptions, the Michigan corporation's research "teams," which have as their aid "Wyandotte betters today and looks to tomorrow," were operating "in high gear."

Contained in the new laboratories building, which has been designated by impartial observers as the finest research facility in the industry, are: laboratories devoted to public sanitation including a complete microbiological section; facilities for studying metal finishing operations which include an exclusive plant-size, power spray washer capable of duplicating almost every commercial operating cycle in use in North American manufacturing plants; a complete commercial type, laundry washroom installation together with latest testing devices for use in studying textiles; a nucleonics laboratory where soils are tagged with radioactive tracers and the efficiency of various cleaning operations is measured with Geiger counters; a physics laboratory where over 23,000 chemicals have been "finger printed" on punched cards. This laboratory is claimed to be the first to adapt high speed electronic equipment to the sorting of this chemical information; the entire building was designed as a perma-



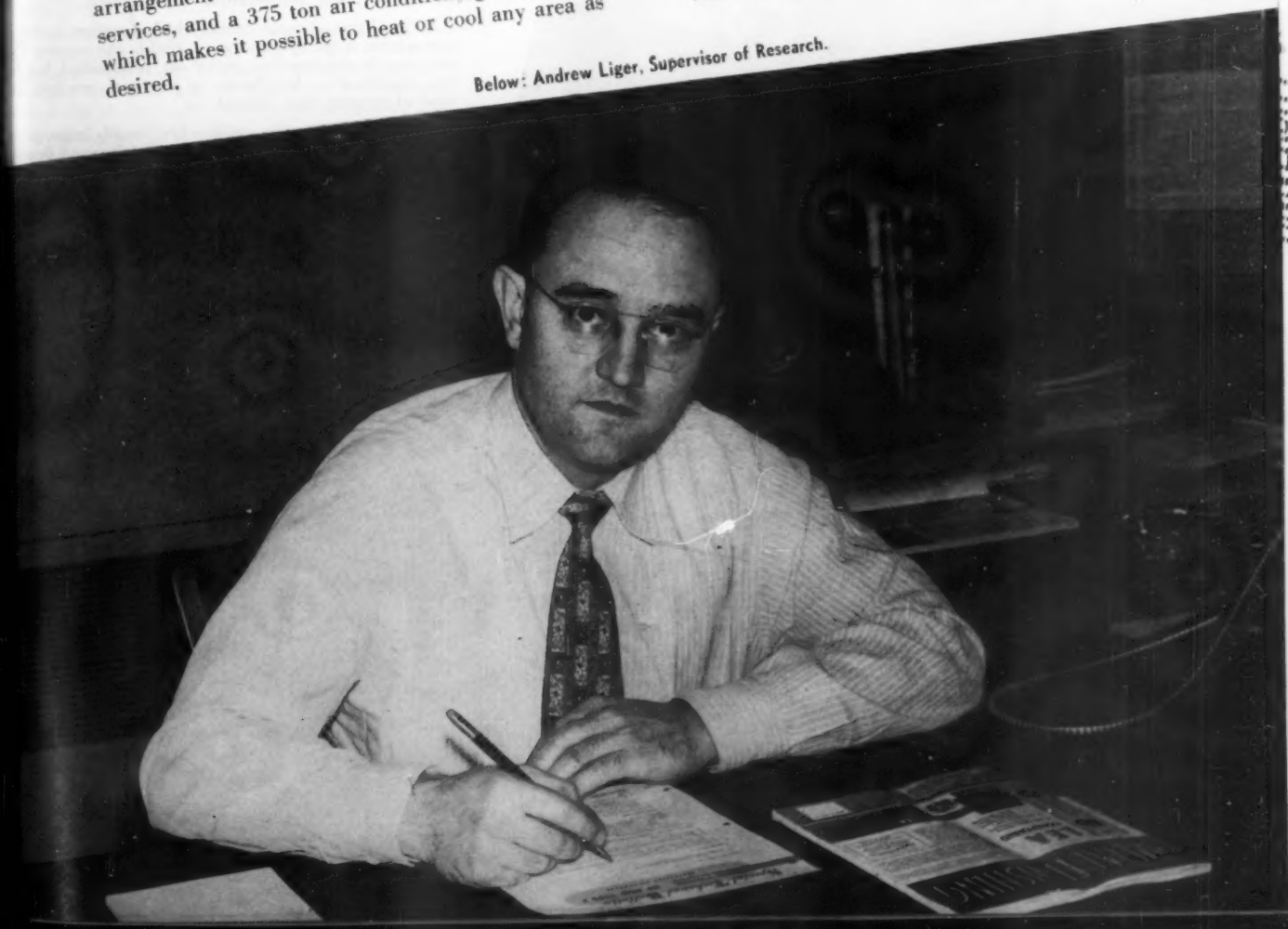
Above: Robert Racine, Manager of Industrial Sales.

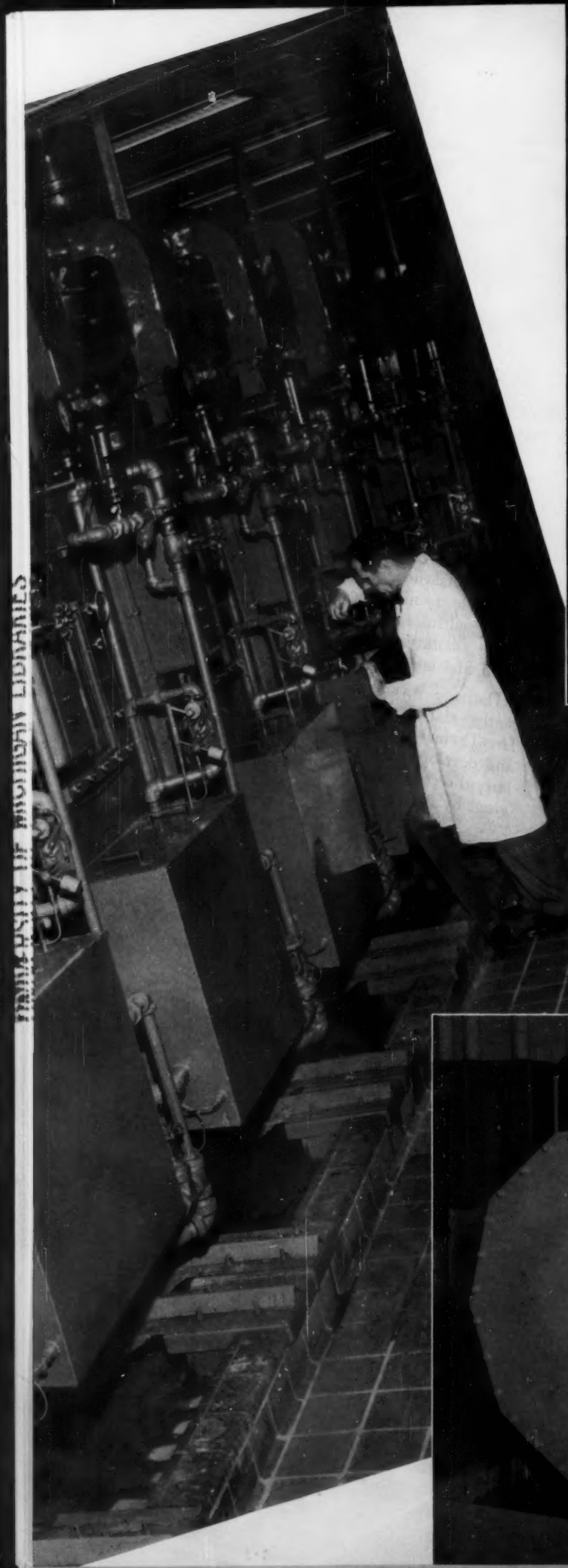
nent "maintenance cleaning project" including one hallway containing 14 different kinds of flooring; an electronics laboratory which develops many of the recording devices used in Wyandotte research and by customers in securing maximum cleaning efficiency; six separate constant humidity, constant temperature rooms which permit testing of packages and storage performances of experimental products; in addition, the new research building contains two wings of organic and analytical laboratories, a library containing over 7,000 volumes and regular issues of 175 technical magazines, patent department, an auditorium seating 150 persons, a unique arrangement for distributing utilities and special services, and a 375 ton air conditioning installation which makes it possible to heat or cool any area as desired.

Considering cleaning and washing operations as an industry, it has been reliably estimated that one-sixth of the world's working hours are devoted to these highly resultful and necessary operations. Here in the new research laboratories a staff of over 200 spends much of its time, with the most efficient equipment obtainable, to make cleaning operations of every kind more resultful, and to reduce the time, energy and cost of the sanitary, maintenance cleaning, washing and germicidal operations performed every working day.

The new Wyandotte research building and the recently enlarged Pilot Plant are under the direction of Dr. Thomas H. Vaughn, vice president of research and development. Wyandotte research that is particularly directed to the Metal Finishing industry is supervised by Andrew Liger.

Below: Andrew Liger, Supervisor of Research.

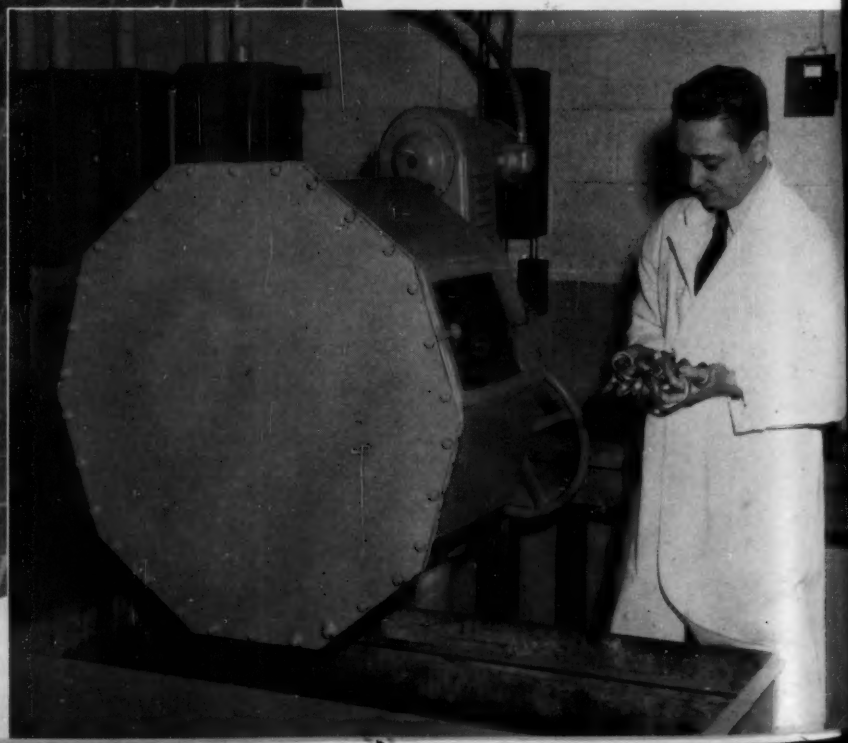




ABOVE: Steel panels are examined as they emerge from a multi-stage spray washing machine in the laboratories of the Industrial Research Department. The wide range of conditions possible in this seven-unit, multi-spray washer enables duplication of practically any industrial washing cycle.

LEFT: Consisting of seven completely independent units this spray washer is the only one of its kind in this country. The units may be disconnected, pulled out, reassembled, and the line shortened or lengthened to duplicate precisely any kind of washing cycle desired.

BELOW: Zinc base die castings are visually inspected by a member of the staff of the Industrial Research Department after running them in a full size tumbling barrel using one of Wyandotte's newer compositions.



BOVE: A portion of the 18 cleaning, electrocleaning and ectroplating tanks of the Industrial Research Department. ch electroplating tank has its individual rectifier and exhaust od, and all tanks are thermostatically regulated. An over-ad monorail aids in handling heavy parts to be cleaned or ated.

GHT: Members of the staff are shown operating the two its of the commercial size buffing and barrel finishing stallation in the Research Building. The buffing and bar-l finishing laboratory provides facilities to attain any sired degree of surface finish on metals and alloys.

ELOW: A member of the Industrial Re-arch Department washes out a small rubber-lined mbling barrel prior to investigating a new experi-ental barrel finishing composition.

The Effect of Chromium Plating of Steel on the Fatigue Limit — Conclusion

By George M. Cabble, Jr.

WHEN the fatigue limits obtained are viewed closely, it can be seen that a number of interesting phenomena are present in some of the graphs.

Graph 1: AISI 4340 Steel, Not Plated, Not Baked.

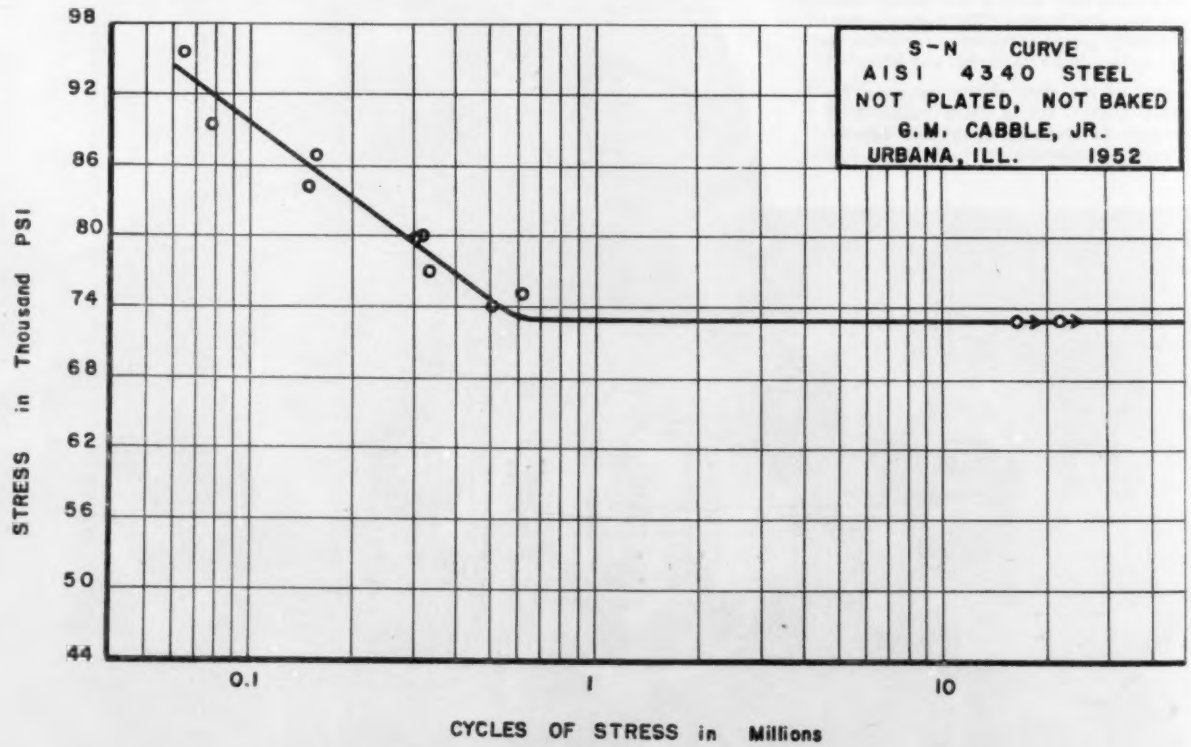
This curve is a well-fitted curve, and well within the scatter band to be expected from this type of steel. Tests by the steel manufacturer show that the fatigue limits of steel from two consecutive heats varied by 7,000 psi. The fatigue limit in this category was found to be 73,000 psi. This is somewhat below the fatigue limits found by the manufacturer. The difference might well be due to variations in heat treatment.

Graph 2: AISI 4340 Steel, Plated Once, Not Baked.

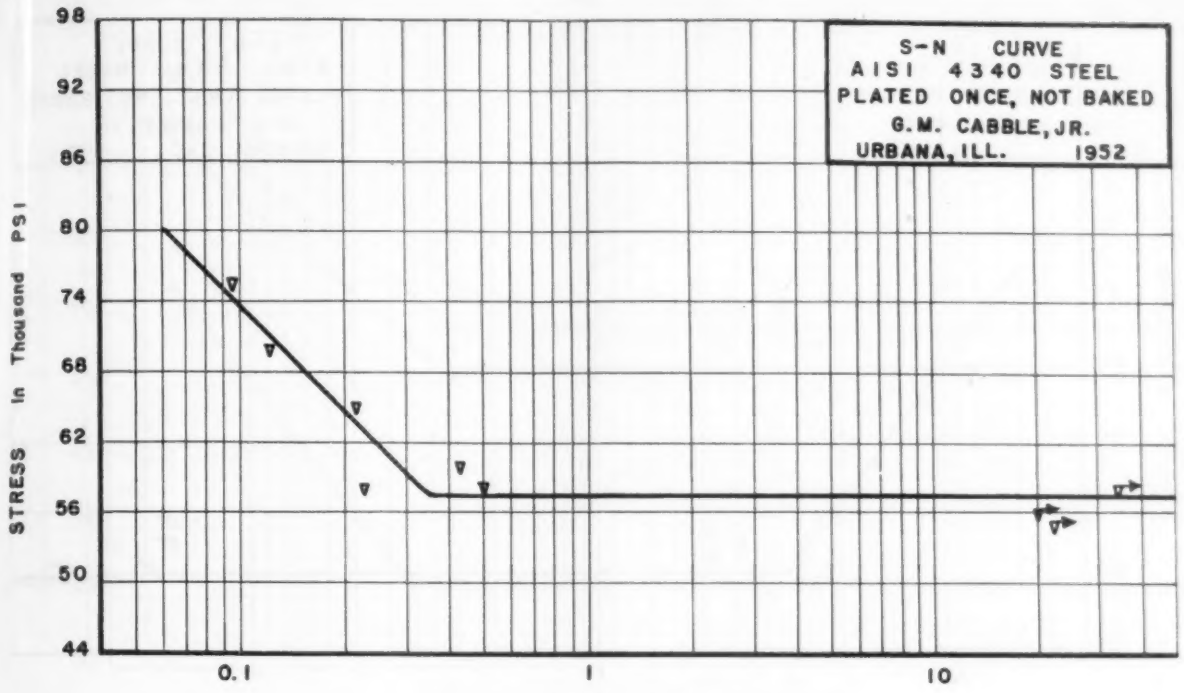
This curve, with the exception of one point, is a well-fitted curve. It appears within the expectation of normal scatter. The exceptional point which failed after 228,000 cycles at a stress of 58,000 psi, might be explained in one of two ways. This specimen was run almost two months after the first specimens of the group, and more than a month after the last previous specimen which ran out at the same stress. It is possible that there is an aging effect due to the chromium plating process, although no mention of such has been found in the literature. The second possibility is that of a "freak" specimen. These "freaks" occur quite frequently in steels such as this. This curve gives a fatigue limit of 57,500 psi. This is a reduction of over 21 percent from that of the unplated steel.

Graph 3: AISI 4340 Steel, Plated Once, Baked Once.

This also is a well-fitted curve with all points but one fitting it very well. This one point, again the last point run, falls considerably above the curve. It was stopped at 4,600,000 cycles, which is not a large enough number of cycles to say that it probably never would have broken. In fact, the machine was stopped because of excessive vibration caused by excessive deformation but not fracture, of the specimen. The point is probably an unsound one. The fatigue limit was therefore established at 72,500 psi which is a re-



Graph 1. 4340 Steel, Not Plated, Not Baked.



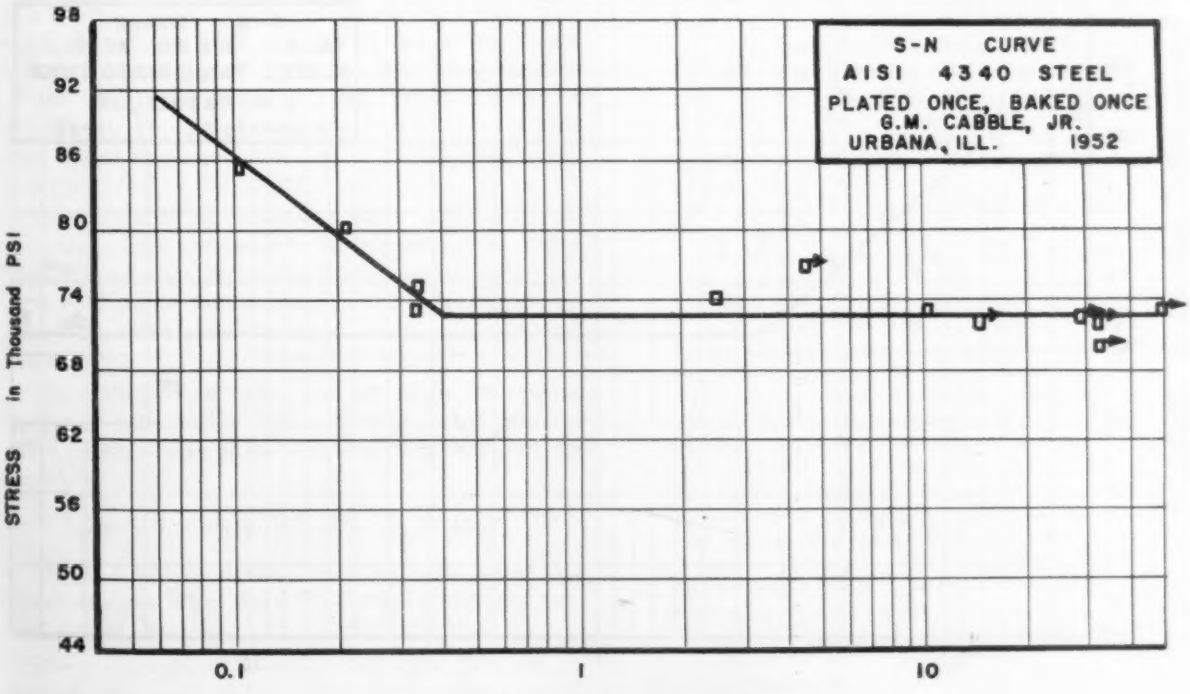
Graph 2. 4340 Steel, Plated Once, Not Baked.

duction of less than one percent from the value for the unplated steel. Another way of stating this would be that the fatigue limit was reduced only three percent as much as it would have been if the steel had not been baked.

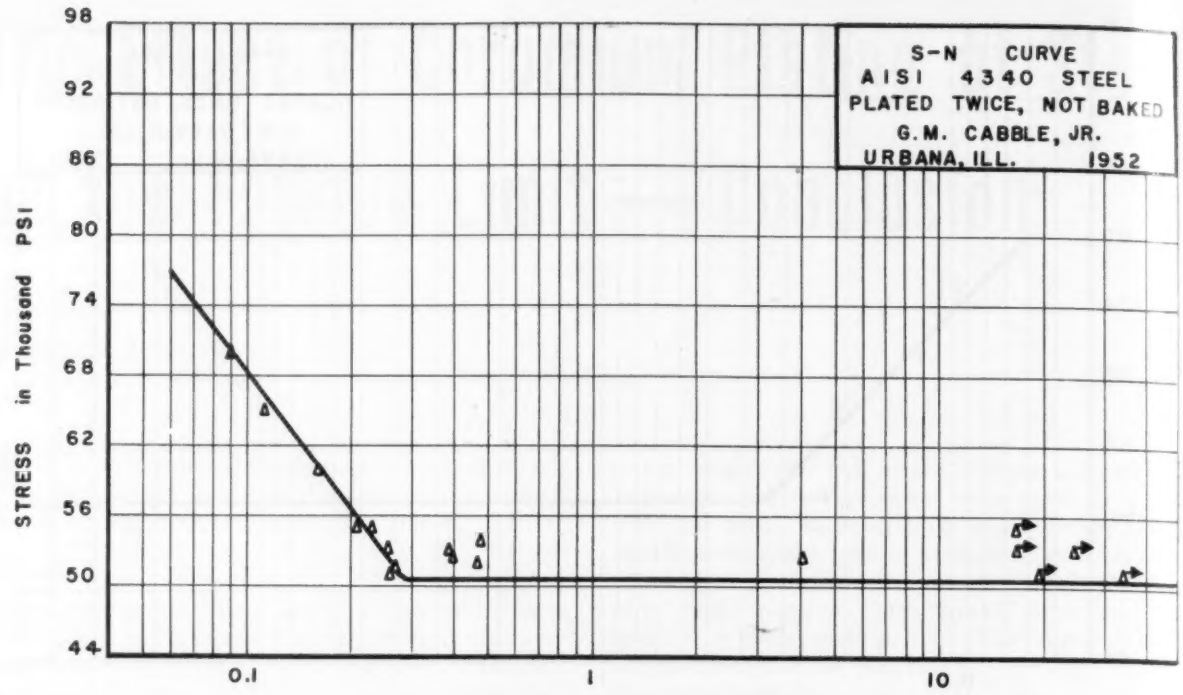
Graph 4: AISI 4340 Steel, Plated Twice, Not Baked.

This set of data is peculiar. The points at the higher stresses seem reasonably regular, but at lower stresses they are scattered. The scatter is large, giving a dispersion band wider than usually found in this type of steel. It was finally decided to draw the fatigue limit at 50,500 psi.

The irregularity of the points, if not due to normal scatter, might be due to any or all of three causes. One condition, about which nothing is known, is the effect of a second plating on the fatigue limit of steel. It is possible that this second plating, in addition to reducing the fatigue limit, also introduces excessive scatter. Another possibility is that the irregularity is due to the



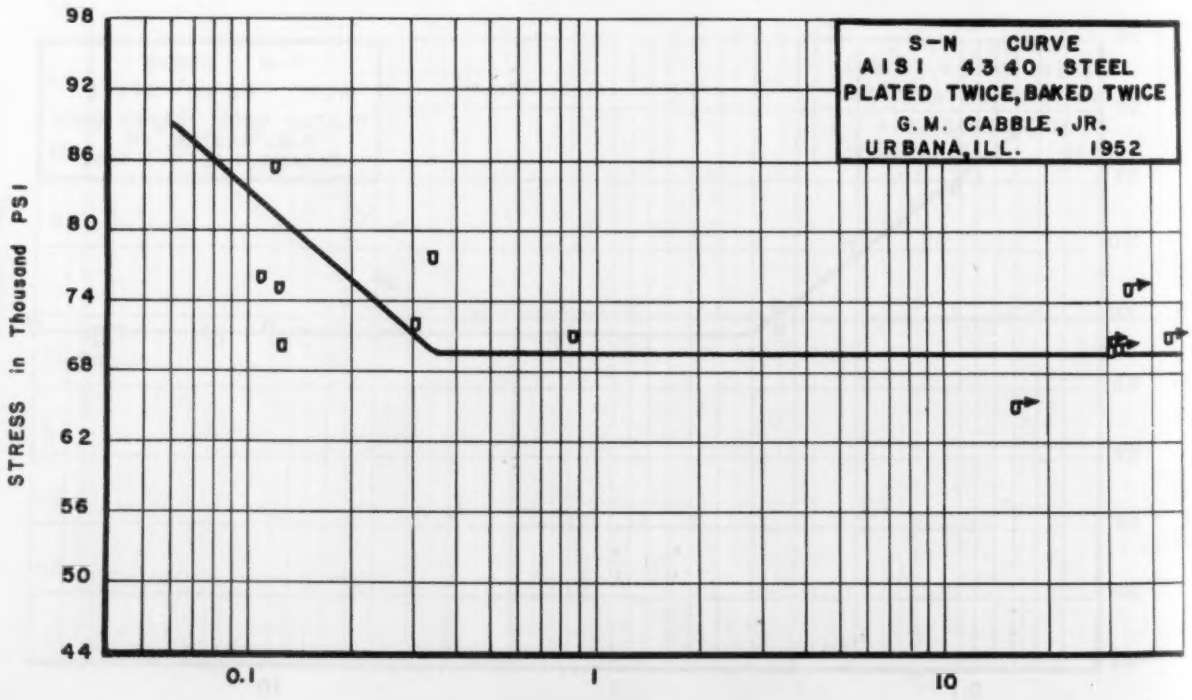
Graph 3. 4340 Steel, Plated Once, Baked Once.



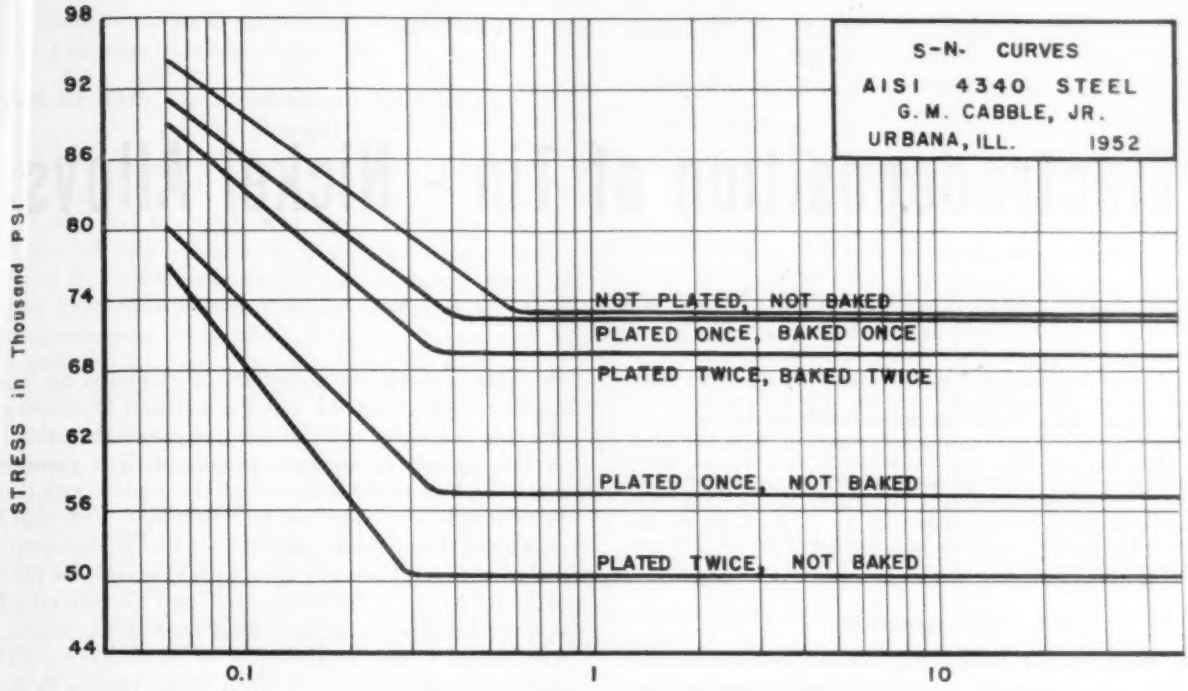
Graph 4. 4340 Steel, Plated Twice, Not Baked.

simulated wear, that is, the buffing operation between platings.

The third possible cause is an aging effect due to chromium plating which would further reduce the strength of the steel as the time after plating increases. There is insufficient evidence to make a definite conclusion in this regard, but the facts should be pointed out. The first twelve specimens were tested during the period three weeks to one month after shipment from the shops. The last seven specimens were tested during the period eight to ten days after shipment. Since both groups were sent by themselves and were not held up waiting for the other groups to be finished, it is safe to assume that the time between the last plating and shipment were approximately the same in both cases. There was then a difference in age of about two weeks at the time of test. All of the first twelve older specimens failed, nine of them at stresses between 51,000



Graph 5. 4340 Steel, Plated Twice, Baked Twice.



Graph 6. Comparative Graph of All Tests.

and 55,000 psi. Of the six tested specimens in the younger group, five ran out at these same stresses and one failed at 55,000 psi. This evidence is not conclusive because of the possibility of other variables being present, but it must be considered.

Graph 5: AISI 4340 Steel, Plated Twice, Baked Twice

In this curve the scatter characteristic of the previous set of data is even more evident. There is a break and a runout at 75,000 psi stress. At 71,000 psi stress there is a break and two runouts. In view of the inconsistent data, the fatigue limit was placed below the lowest value of stress at which there was a break regardless of the number of runouts at that stress, a value of 69,500 psi. This means that the fatigue limit of this steel plated twice and baked after each plating is 95 percent of that of the unplated steel.

The pecularity of excessive scatter which occurs in this curve does not seem to be a result of an aging factor because the break and the runout at 75,000 psi were both run on the same day, and the break and one runout at 70,000 psi were run within two days of each other.

The scatter might have been caused by the buffing operation between the first and second platings. Another possible cause is the second plating on top of the first.

Graph 6: Comparative Plot of All Data.

This is a plot of all the previous graphs put in one figure to show better the relationship between the various sets of data.

The percentage of reduction in fatigue limit due to a single chromium plating found in this investigation agrees quite closely to those found by most previous investigators.

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Electrodeposition of Tin - Nickel Alloys

Further experimental work, completed since the original paper was published on the electrodeposition of tin-nickel alloys from chloride-fluoride baths, has produced some interesting new information. With the kind permission of *The Electrochemical Society*, we have condensed for our readers the paper recently presented by J. W. Cuthbertson and N. Parkinson of the Tin Research Institute, together with H. P. Rooksby of the General Electric Co., Ltd., and published in the *Journal* of the Society.

Introduction

A METHOD of codepositing tin and nickel in roughly equal atomic proportions was described recently by one of the present authors.[1] The solution used contained stannous chloride, nickel chloride, ammonium bifluoride, and sodium fluoride, and the codeposition was dependent on the complexing action of the fluorides whereby the deposition potentials of the tin and nickel were brought sufficiently close to enable an alloy plate to be deposited. Much fundamental work was done in perfecting this process, and as the first report described only the essentials necessary to understand its technology it was thought that a description of the detailed research carried out might be of interest. The theory of alloy plating is still in the elementary stage, and most, if not all, of the successful processes of this type have been evolved by trial and error. The present process is not a complete exception to this, but its perfection is partly attributable to theoretical reasoning. Moreover, the experimental work, particularly that completed since the original paper was written, has shed some interesting information on the theory of alloy plating, suggesting that in this particular case an entirely novel mechanism of deposition is functioning.

Chloride-fluoride electrolytes will not deposit tin-nickel alloys over the whole composition range. It is a feature of these electrolytes, and apparently also of a more recently examined acetate type of electrolyte, that they favor the deposition of tin and nickel in roughly equal atomic proportions. With difficulty, it is possible to deposit alloys of other than this basic composition, the limiting tin contents being about 40 per cent and 90 per cent, respectively. It would not be practicable, however, on a commercial basis, to use either of these electrolytes for depositing plate of other than the above standard composition.

Principles of the Plating Process

It is quite possible to codeposit tin and nickel from mixed simple salt solutions but under conditions more suited to the research laboratory than to the works. Parkinson has shown that while the difference between the normal electrode potentials of stannous tin and nickel is only about 0.1 volt the addition of stannous chloride to a nickel chloride solution causes the nobility of the cathode to increase rapidly until a point is reached where the cathode potential coincides with that for a simple acid stannous tin electrolyte. The mixed electrolyte then deposits almost pure tin. To deposit tin and nickel simultaneously from such solutions, the ratio of nickel to tin in the electrolyte must be maintained at a much higher value than their ratio in the deposit. Any change in the metal content of the electrolyte will then be accompanied by a much larger change in the composition of the deposit, and control of the latter within close limits becomes difficult or impossible. Parkinson has also shown that there are other objections to mixed simple salt baths.

By complexing the tin ions and the nickel ions or both, it is possible to bring the deposition potentials for tin and nickel close together and also, by the choice of a suitably complexing medium, to reduce the high acidity which necessarily characterizes straight stannous salt electrolytes.

Fluorides are known to exert a strong complexing influence on stannous tin ions in acid solution, and one electrotinning solution depends on this for its success.[2] In the present work various complexing agents have been tried but, with the exception of an acetate type of electrolyte that has not yet been fully investigated, the best results have been obtained from fluoride-containing electrolytes. A process based on such an electrolyte has been perfected and is now coming into commercial use in Great Britain. The composition of the electrolyte decided on for development and referred to as the standard electrolyte is as follows: stannous chloride, 50 g./l.; nickel chloride, 300 g./l.; sodium fluoride, 28 g./l.; ammonium bifluoride, 35 g./l.

Effect of Surface Active Agents

It has been shown earlier that many surface active agents when added to the standard tin-nickel electrolyte, unless present in very small concentrations, inhibit the deposition of nickel except at low current densities. This effect has been further examined for the substance Lubrol W, a cetyl-alcohol polyethylene-oxide condensate, which is known to function satisfactorily as an addition agent in stannous chloride electrolytes.

The addition of 2 g./l. of Lubrol W to the standard tin-nickel bath completely suppresses the deposition of the nickel and only a dull tin deposit is obtained. In very small amounts Lubrol W acts as a brightener and does not interfere with alloy formation but the quan-

tity permitted is so small that the use of this detergent could not be recommended safely.

Effect of Bath Composition on Composition of the Deposit

Cathodic polarization curves give some indication of the manner in which the composition of the deposit may be expected to change with variation in the concentration of each constituent of the electrolyte. The effects of the variables of the process on deposit composition have already been outlined by Parkinson. A fuller examination of the effect of varying the ratio of tin to nickel in the electrolyte and of varying the fluorine concentration of the electrolyte has since been made.

Varying the Tin-Nickel Ratio in the Bath

A solution containing 50 g./l. of stannous chloride, 28 g./l. of sodium fluoride, and 35 g./l. of ammonium bifluoride was prepared and varying amounts of nickel chloride were added thereto. Deposits were made over the current density range 5-40 amp./ft.^{2}. The results obtained are summarized in Table I. The figures recorded are the average of from two to four tests in each case; there was very little scatter between the individual test results in each group.

TABLE I. *Effect of tin-nickel ratio in electrolyte on deposit composition*
(Temperature: 65°C)

$NiCl_2$, g/l	Per cent tin in deposit at a current density of:			
	5 amp/ft²	15 amp/ft²	24 amp/ft²	40 amp/ft²
20	92.3	88.8	—	—
60	70.5	76.5	79.0	—
100	69.5	72.5	82.3	—
150	66.8	69.8	72.3	—
200	65.5	66.5	68.5	—
300	63.3	64.8	65.8	63.3
400	62.8	64.8	62.3	63.0

Except at the lowest concentrations of nickel, the composition of the deposit remains fairly constant over the range examined. Over the range 60-150 g./l. of nickel chloride there is a tendency for the amount of nickel in the deposit to decrease as the current density is increased. Over the whole range the amount of nickel deposited increases, at first rapidly but later very slowly, as the concentration of nickel chloride is increased. For the standard solution containing 300 g./l. of nickel chloride, changes in current density and in nickel chloride concentration have little effect on deposit composition.

Varying the Fluorine Concentration

Using a solution containing 50 g./l. of stannous chloride and 300 g./l. of nickel chloride, the effect of varying the sodium fluoride concentration was studied. This solution contained no ammonium bifluoride and therefore no adventitious hydrofluoric acid; the effect of free hydrofluoric acid concentration was examined independently. The results obtained are shown in Table II from which it is seen that an increase in sodium fluoride concentration is accompanied by a decrease in the tin content of the deposit.

TABLE II. *Effect of sodium fluoride concentration on deposit composition*
(Temperature: 58°C; current density: 24 amp/ft²)

Sodium fluoride, g/l	Per cent tin in deposit
20	72.5
40	68.0
60	62.5

The effect of hydrofluoric acid concentration was determined by varying the concentration of acid in a solution containing the above amounts of stannous chloride and nickel chloride along with some ammonium bifluoride. The solution was initially made up to contain 38 g./l. of ammonium bifluoride, corresponding to 12 g./l. of free hydrofluoric acid; further additions of 2, 4, and 8 g./l. of acid were made. Table III shows that variation in the free acid concentration over the range concerned has no marked effect on deposit composition; as the acid concentration increases the amount of tin in the deposit slightly diminishes.

Varying the Temperature and Current Density

The effect of these variables was dealt with in the original paper. Summarizing here, variation in the temperature from 45° to 70°C. and in the current density from 18 amp./ft.^{2} to 36 amp./ft.^{2} has little effect on deposit composition. The brightness of the plate falls as the temperature is reduced, however, unless the current density is also reduced, and in practice the temperature should not be allowed to fall below 60°C.

From the above results it will be appreciated that it is not easy to deposit tin-nickel alloy plate over a wide composition range from the type of electrolyte under consideration. As information on the structure of deposits covering as wide a range of composition as possible was wanted, an attempt was made by modifying the composition of the electrolyte to deposit plate of other than the standard composition (65 per cent tin, 35 per cent nickel). By resorting to the solutions given in Table IV it was possible to obtain deposits having limiting tin contents of 42 per cent and 72 per cent, respectively; further work has since enabled the upper limit to be extended to 87 per cent of tin but not for bright plate. It is remarkable that the change in the composition of the deposit is always relatively much smaller than the change in the tin/nickel ratio in the electrolyte. Also, a change in the cathode current density does not greatly alter deposit composition, unless the solution is relatively low in total metal content. In

TABLE III. *Effect of free hydrofluoric acid concentration on deposit composition*
(Temperature: 58°C; current density: 24 amp/ft²)

Free hydrofluoric acid, g/l	Per cent tin in deposit
12	73.0
14	71.5
16	71.0
20	70.0

Table IV the effect of current density is only marked for solution (a) which contains much less metal than solutions (b) and (c) and appreciably less than solution (d).

Throwing Power and Conductivity

Throwing power means rather more in alloy plating than it does in the deposition of a single metal. The term embraces the following considerations: (a) distribution of metal thickness over the surface of an irregular cathode, i.e., conventional throwing power; (b) variation in the composition of the deposit over the surface of an irregular cathode (hereafter referred to as composition throwing power); and (c) variation in the brightness of the deposit over the surface of an irregular cathode (hereafter referred to as brightness throwing power).

TABLE IV. *Effect of electrolyte composition and current density on deposit composition*

(Temperature: 65°C)

	Composition of electrolyte, g/l		Current density, amp/ft²	Per cent tin in deposit
(a)	$SnCl_2$, $2H_2O$	21	16	60
	NaF	11		
	NH_4HF_2	15	32	42
	$NiCl_2$, $6H_2O$	180		
(b)	$SnCl_2$, $2H_2O$	100		
	NaF	75	16	62
	NH_4HF_2	100		
	$NiCl_2$, $6H_2O$	500	32	59
(c)	$SnCl_2$, $2H_2O$	100	16	72
	NiF_2	75	40	72
	$NiCl_2$, $6H_2O$	325		
	KCl	100	64	66
(d)	SnF_2	50	24	64
	NaF	75	40	61
	$NiCl_2$, $6H_2O$	200	64	51

Previous work has established that the composition throwing power and brightness throwing power are excellent. No significant variation either in composition or brightness has been observed on irregular cathodes when plated in a clean solution. Contaminated electrolytes do not give fully bright deposits, but the variation in brightness is not then related to the unavoidable variations in surface current density but rather to the geometry of the work insofar as certain surfaces are more favorably placed than others to collect foreign matter. Even under these conditions the composition throwing power remains at a high level.

The thickness throwing power was measured quantitatively by using the bent cathode test. Cathodes bent at a right angle were plated in the standard tin-nickel solution under conditions calculated to give a deposit thickness of 0.0005 in. based on the total cathode area. After plating, the tin-nickel coating was protected by an overlay of 0.02 in. of electrodeposited copper and the cathodes were then sectioned and the thickness of the alloy plate measured under the microscope.

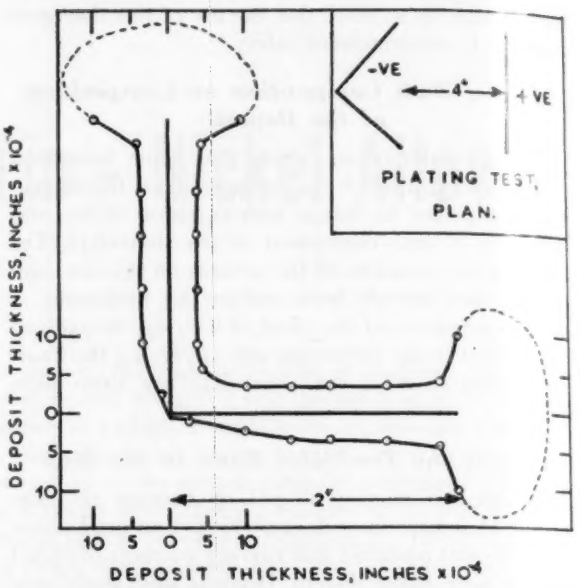

Figure 1. Throwing power test, showing distribution of deposit on bent cathode placed symmetrically with respect to anode.

The results obtained for two different sets of conditions are summarized in Fig. 1 and 2. Except at the extreme edges of the cathodes, where the thickness of the plate approaches twice the average, and at the back of the bend where the thickness diminishes to about 0.0001 in., the thickness distribution is seen to remain very constant; it is particularly noteworthy that so much alloy has deposited on the remote surfaces of the cathode. Few, if any, other electrolytes are capable of simulating this performance.

It was decided to supplement these tests by calculating the throwing power and it was therefore necessary to determine the conductivity of the electrolyte. Conductivity measurements were made over the temperature range 40°-65°C. with the results shown in Fig. 3 which includes a comparison curve for a straight nickel chloride solution. Of the two solutions the tin-nickel electrolyte has a somewhat higher con-

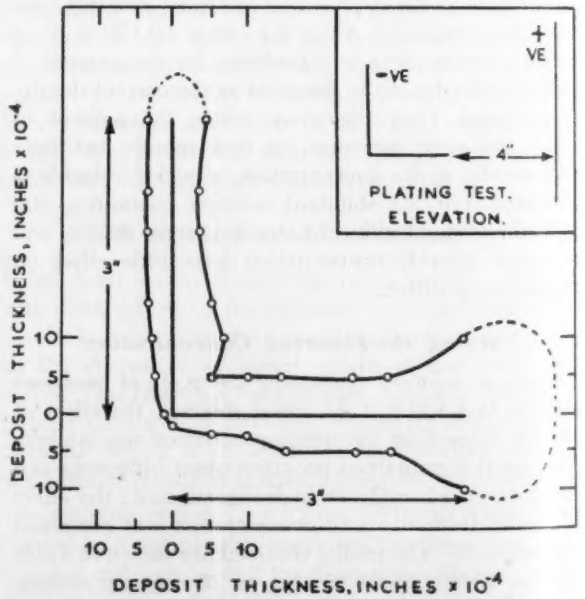

Figure 2. Throwing power test, showing distribution of deposit on bent cathode placed unsymmetrically with respect to anode.

ductivity, its specific conductivity at 65°C. being 0.29 mhos per cm.[3].

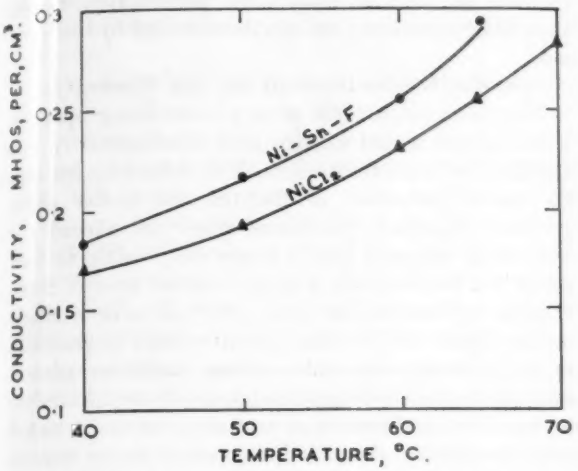

Figure 3. Variation of conductivity with temperature for the standard alloy plating electrolyte and for a nickel chloride electrolyte.

TABLE V. *Throwing numbers for some common plating baths*

Electrolyte	*N*	Source of information
Tin-nickel	0.0145	Authors
Silver cyanide	0.023	Gardam[3]
Copper sulfate	0.0115	Wesley and Roehl[4]
Nickel chloride	0.0067	Wesley and Roehl[4]
Watts type nickel	0.0024	Wesley and Roehl[4]
Hard nickel	0.005	Wesley and Roehl[4]

Gardam's throwing number, N, was calculated from the formula $N = \frac{b}{2p}$ where p is the specific resistance of the electrolyte and b is a constant. For the tin-nickel electrolyte at 65°C., $b = 0.1$ and $p = \frac{1}{0.29} = 3.45$, hence $N = 0.0145$. This is a high value, as is evident from the values of N for various electrolytes given in Table V.

For bright, or almost bright plate, as normally obtained from the standard electrolyte, the effect of current density on deposit composition is negligible. The composition throwing power in practice is so good that analytical checking of deposit composition is not necessary. If, through the electrolyte getting out of balance, the deposit becomes dull, plate composition may vary with current density to some extent, but even in extreme cases there is not much departure from the equi-atomic deposition rate.

The brightness throwing power is generally high. Slight variations in brightness may occur over the surface of irregular cathodes.

Effect of Various Cations on Internal Stress in the Deposit

Electrodeposited tin-nickel alloy is an intermetallic compound and consequently is fairly hard, the hardness of deposits of the standard composition being around 700 on the Vickers diamond scale. Like many such compounds the alloy is inherently somewhat brittle but, provided the plate is free from internal stress, the brittleness is not sufficient to impair its serviceability or to cause the coating to flake under impact. Owing to the brittleness, however, it is not possible to fabricate by sharp bending sheet material plated with tin-nickel, as the compressive stress induced in the coating on the inside of the bend usually causes some of the plate to flake off.

To give serviceability the plate must be deposited in a stress-free condition. The amount of stress in the plate and also its brightness vary with the nature of the foreign cations that are necessarily present in the electrolyte. These cations are unavoidably introduced via the fluoride additions and may be H^+, Na^+, K^+, or NH_4^+; they may be present either individually or collectively, according to the nature of the fluoride or fluorides employed. Tin-nickel plate of constant composition can be deposited from a mixed chloride electrolyte containing any one or alternatively containing two, three, or even all of these cations, but an acceptable deposit from the viewpoint of stress and brightness is not obtained in every instance.

An examination was made of the effect of these cations on the properties of the plate. Tests were carried out using a solution containing 50 g./l. of stannous chloride and 300 g./l. of nickel chloride to which the following additions were made: (a) sodium fluoride, ammonium bifluoride, and hydrofluoric acid; (b) potassium fluoride and hydrofluoric acid; (c) sodium fluoride and hydrofluoric acid; (d) ammonium fluoride and hydrofluoric acid. In each case the solution was adjusted to a total fluoride content of 38 g. of F. per liter, of which 12 g./l. was present as hydrofluoric acid.

The magnitude and nature of the stress were estimated by depositing 0.0005 in. of tin-nickel alloy on one side of a copper strip measuring 6 x 1 x 0.005 in. The strip was held rigidly at the upper end and the stress was determined qualitatively from the curvature, if any, induced by the deposit. This test was reasonably reproducible and served as a useful indication of the relationship between the nature of the foreign cations and the stress.

With the exception of solution (a), all the remaining solutions gave stressed deposits. Solution (b) gave the greatest amount of stress. Solutions (b) and (c) induced a compressive stress while solution (d) induced a tensile stress of roughly the magnitude of that observed for solution (c). Solution (a) gave substantially stress-free deposits. It thus seems that stress is associated with the presence of the ions K^+, Na^+, NH_4^+. Hydrofluoric acid itself at the concentrations used does not induce stress but can do so if present in amounts exceeding 12 g./l., and for this reason care should be taken not to allow the free acid concentration greatly to exceed this limit in practice.

The fact that solution (a) does not induce stress is attributed to the presence of both Na^+ and NH_4^+

A balanced reaction results, the negative stress induced by the sodium ions being neutralized by the positive stress induced by the ammonium ions. The reasons underlying the effect of these foreign ions on stress are not known at the moment and further investigations are being conducted.

Effect of Various Cations on Brightness and Appearance of the Deposit

These tests suggest that the brightness of the plate depends on the nature of the fluoride present, that is, on the nature of the cation associated with the fluorine anion. Further work was undertaken to find the most desirable fluoride or fluorides from the viewpoint of the brightness and general appearance of the plate.

Using an electrolyte containing 50 g./l. of stannous chloride and 300 g./l. of nickel chloride with some free hydrofluoric acid, the effects of (a) sodium fluoride, (b) ammonium bifluoride, (c) sodium fluoride and ammonium bifluoride in equal amounts, and (d) potassium fluoride, were examined. As previous work had shown that the presence of hydrofluoric acid was always desirable no tests were made in acid-free electrolytes. In each of the above groups tests were carried out at fluorine concentrations of 1.0*M*, 1.5*M*, and 1.75*M*; this does not include any fluorine derived from the hydrofluoric acid which, for each concentration of alkali metal or ammonium bifluoride, was adjusted to 4, 8, 12, and 16 g./l. This makes 48 electrolytes in all. Brass panels, measuring 3 x 2 in., polished on one side, were plated at 9, 18, and 36 amp./ft.^{2} in each electrolyte; the temperature in every case was 64°C. and the electrolytes were agitated during deposition. The appearance of the plate was assessed by visual examination.

Owing to the high reflectivity of many of the samples it is extremely difficult to obtain an informative photograph of them. The following comments, however, summarize the results of the visual examination.

1. For the metal concentrations used, the fluorine concentration, not including the fluorine from the hydrofluoric acid, must exceed 1.0*M* for satisfactory deposition.

2. Potassium fluoride at all concentrations, irrespective of the hydrofluoric acid concentration, gives a plate that is neither as bright as is desirable nor as bright as can be obtained from the use of other fluorides.

3. Ammonium bifluoride behaves similarly to potassium fluoride, but is less satisfactory.

4. Sodium fluoride along with free hydrofluoric acid over a certain concentration range for each gives excellent bright plate over the whole of the current density range investigated.

It thus appears that the sodium ion is at least partly responsible for the brightness of the plate. This is confirmed by the observation that solutions containing ammonium bifluoride alone, which normally produce semibright plate, can be made to deposit fully bright plate by adding to them either sodium fluoride or sodium chloride.

From the brightness viewpoint the presence of ammonium bifluoride is not really essential. The addition of the ammonium salt is advisable, however, for the reason given in the preceding section. Also there is some evidence that solutions containing both sodium fluoride and ammonium bifluoride are rather more tolerant of metallic impurities, particularly copper, than those containing sodium fluoride and hydrofluoric acid.

Anodic Replenishment of the Electrolyte

The tin-nickel process is at present being operated with tin and nickel anodes used simultaneously and supplied by separate circuits. The difference between the anode potentials of the tin and nickel under properly balanced conditions does not exceed 0.1 volt which suggests that it might be possible to feed all of the anodes from a single current source. Some measure of success has been obtained with a single anode circuit but the dual circuit system is generally to be preferred. The dual system facilitates control and enables accurate replenishment of the electrolyte to be effected. There is a tendency for a tin-nickel alloy containing about 76 per cent of tin to deposit chemically on the tin anodes, whether the bath is working or not. These anodes must therefore be bagged to retain the resultant sludge. The amount of sludge formed in terms of work plated is comparatively small, and the sludging has no deleterious effect on the cathode deposit.

Alternatively, operation with alloy anodes is a possibility. Cast anodes containing the same amounts of tin and nickel as in the cathode deposit have a duplex structure, consisting of $Ni_3Sn_2 + Ni_3Sn_4$. Such a structure is unsatisfactory as the Ni_3Sn_2 is dissolved preferentially. A single phase structure appears to be essential, and this limits the available alloys to either Ni_3Sn_2 or Ni_3Sn. Neither of these compounds corresponds exactly in composition to the deposit (which is approximately NiSn) and, although each compound dissolves smoothly in the electrolyte without the formation of sludge, neither compound enables the electrolyte to be kept completely in balance. Alloy anodes have not been tested outside the laboratory where a true assessment of their performance is complicated by the high drag-out from small tanks. From work already done it is thought that anodes consisting of Ni_3Sn_4 might prove satisfactory in practice while the evidence is that Ni_3Sn_2 is less promising. The use of Ni_3Sn_2 anodes leads to a steady fall in the tin content of the electrolyte. On the other hand, Ni_3Sn_4 contains proportionately more tin than the deposit and would be expected to lead to enrichment of the electrolyte in tin, but since some tin is lost through oxidation the balance may prove to be partly redressed. Unfortunately, Ni_3Sn_4 cannot be made merely by casting. The cast alloy has a duplex structure and prolonged annealing out of contact with air is necessary to convert the cast structure wholly to Ni_3Sn_4.

Ideally, alloy anodes of composition NiSn are wanted but, apart from electrodeposition, no means of making such an alloy is known at present. It is possible that powder metallurgical methods might enable a suitable alloy to be produced and this line of approach is being considered. The main advantages accruing from the use of alloy anodes are reduction or elimination of anode sludging and simplification of electrical control.

General Discussion

Although some relevant information has been collected it is impossible at this stage to advance other than a tentative theory of the tin-nickel alloy plating process.

The following facts have been firmly established: (a) the chloride-fluoride electrolyte favors the codeposition of tin and nickel in equal atomic proportions; (b) an entirely different electrolyte containing the two metals as acetates when operated at temperatures about 65°C. has been found to produce bright tin-nickel alloy plate of the same composition as that obtained from the chloride-fluoride electrolyte. Both of these electrolytes deposit a tin-nickel alloy chemically by direct immersion on tin.

It is difficult to explain the constancy of composition of the cathode deposit and the chemical deposition of tin-nickel on tin by any mechanism other than one involving the presence in these electrolytes of some complex ion containing both tin and nickel. There is some further evidence supporting this possibility. When making up the tin-nickel electrolyte it is customary first to dissolve the nickel chloride in water and then to add the fluorides and stannous chloride in that order. When about half of the fluoride additions have been made the solution often becomes turbid and develops a tendency to precipitate nickel salts. On adding the stannous chloride the solution becomes clear and if more fluoride is added the turbidity does not reappear. It is suggested that this solubility effect is consistent with the presence of a tin-nickel complex.

The fact that a tin-nickel alloy cannot readily be deposited from a stannous chloride-nickel chloride bath except in the presence of fluorine suggests that the fluorine ion must in some way be bound up with the tin-nickel complex. Mixed fluorides of tin and nickel are well known, and it may be significant that light green crystals of a previously unreported compound of this type having the formula $NiF_2{\cdot}2SnF_2{\cdot}6H_2O$ have been isolated from the tin-nickel electrolyte. The high throwing power of the tin-nickel electrolyte in respect of both thickness and composition further suggests that deposition does not occur directly from tin and nickel ions. Although the complexing effect of fluorides has been shown to be much more marked for a straight stannous chloride solution than for a straight nickel chloride solution there is evidence of complex formation in the latter case. The view that in the standard alloy plating bath both the tin ions and the nickel ions are complex is therefore not inconsistent with the experimental results obtained for straight solutions.

The postulate of a complex mixed metal-fluorine ion is believed to be entirely novel. There is not sufficient evidence available at present to enable the structure of the complex to be predicted with any degree of certainty. Both tin and nickel form fluorine coordination compounds with covalency numbers of four and six, and it is conceivable that the tin-nickel-fluorine complex has a structure modelled on similar lines. It is believed that the ion is in any case dimensionally large compared with the stannous ion and the nickel ion. It seems to be fairly certain that simple metal ions are present freely in the electrolyte in addition to the complex ion, but under normal conditions the simple ions are not discharged as their deposition potentials are too high. However, under certain circumstances it is possible to discharge at any rate the stannous ion in preference to the complex ion, the notable instance being when surface-active agents are present in the electrolyte. It has already been mentioned that such additions when present in other than very small amounts greatly favor the deposition of tin.

From the practical viewpoint, one of the most noteworthy features of the chloride-fluoride tin-nickel electrolyte is the constancy of composition of the deposits obtained from it. This property of the solution greatly simplifies the control of the process and makes it almost as easy to operate as a single metal plating process.

Conclusion

This paper describes the laboratory work that has been carried out on the codeposition of tin and nickel from chloride-fluoride electrolytes.

Although laboratory research is continuing, sufficient information has been obtained to enable industrial development to commence, and at the time of writing several plants are in operation. The largest of these plants has a capacity of 2000 gal. and has now been working for about a year. Experience gained with this plant and with others since installed has indicated directions in which the process might be improved. Basically, the process has proved satisfactory. The brightness of the deposit, however, has not normally been quite good enough to enable all final finishing to be dispensed with, while pitting has occasionally proved a little troublesome. The further work now in hand is mainly directed toward finding suitable additions to improve brightness and to combat pitting, and progress is being made in each field. Practical experience has also suggested directions in which the chemical engineering of tin-nickel plating plant might be improved, and this applies in particular to the filtration and circulation of the electrolyte.

Considering the very short time that this new process has been in industrial use the results obtained to date can justly be regarded as most gratifying. The view has, in fact, been expressed by a user that in one year tin-nickel has made as much industrial headway as electrodeposited chromium made in the first ten years!

The tin-nickel process is being used for finishing a wide variety of articles, including automobile fittings, domestic goods, battery cases, etc. The plate is fully as tarnish resisting as chromium and has a more pleasing color. The blueness of chromium is entirely absent, tin-nickel being characterized by a faint rose-pink tint.

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EXTRACTS
From the World's Plating Literature

Electroplating of Brass

J. Daurat. *La Metallurgie*, vol. 84, No. 6, p. 461.

In a previous issue and already abstracted, the fundamental principles of electropolishing of brass have been considered (see *La Metallurgie*, vol. 84, No. 5 — already abstracted). The present matter covers the practical application of the electropolishing procedure. It was previously mentioned that the electropolishing is conducted by suspending the parts from a rotating anode support; with parts of average dimensions, some 60 to 100 workpieces are suspended from the rotary support and immersed in the bath. The treatment vessel containing the electropolishing solution is constructed in such a manner that it is impossible for the parts being rotated through the solution to come in contact with the cathode during any part of the processing. To achieve this object in the cylindrical steel reservoir which constitutes the cathode, there is installed a smaller annular cylindrical vessel of porous ceramic, the space between this porous pot and the outer steel vessel being a few centimeters. This annular space contains the cooling coils in which cold water is circulated with the object of maintaining the bath temperature at about 37°C. The brass parts being electropolished are placed in the interior of the porous ceramic vessel and this gives absolute assurance of no possibility of short circuit with the outer steel vessel during electropolishing. This also obviates any surface roughening which could occur without this porous diaphragm. Small pieces of metal which are detached and normally loosely adhere to the cathode, can become detached again otherwise and adhere to the electropolished surface, causing roughening. After electropolishing, the anode support on which the parts are suspended is raised out of the bath and the parts are allowed to drain above the bath for a few seconds. They are then given a first rinse, which is immediately followed by the second rinse which is conducted warm at 65°C. The first rinse water is used for bath make-up.

In the bath given, brass parts of composition 30% to 70% can be treated and also numerous other metals and alloys are given a very good surface finish. Thus, in addition to brass alloys, no difficulty is experienced in treating in this electropolishing bath copper and various copper alloy such as beryllium copper, nickel silver, and copper-tin-zinc alloys. Stainless steels of very varying compositions and some aluminum alloys electropolish equally well in this bath. In addition to the above alloys, some of the special alloys characterized by extreme hardness, wear resistance and resistance to corrosive attack, such as the prototype alloy of this class of nickel-molybdenum-chromium-iron can also be treated in this bath in the above manner and acquire a very brilliant surface luster, resembling the brilliant yellowish gold color of brass.

Technical Requirements for Electropolishing

L. Meunier; *Galvano* (Paris), vol. 21, No. 188, pp. 15-19.

Users of electropolishing procedures often find themselves confronted with complex problems because each industrial application represents a particular case for which it is necessary to find the most favorable solution while finding simultaneously a satisfactory solution to the numerous other technical and commercial considerations involved. Up to comparatively recently there was practically no method of systematic research into the fundamental conditions of electropolishing techniques and empiricism reigned supreme. If, for example, it was a question of electropolishing a particular alloy, an attempt was made to approach a suitable bath by successively correcting a bath composition which had been found suitable for the treatment of the main pure constituent of the alloy or of an alloy of approximating composition.

The choice of an electropolishing bath is limited as there are only two main groups available, those based on concentrated phosphoric acid and those based on perchloric acid, without mention of the cyanide baths whose field of application is very limited. But within the framework of these two main groups a multitude of formulas are encountered which mostly only serve for the electropolishing of one single metal. Although there is considerable diversity of thought regarding the electropolishing procedure, certain pertinent questions appear to have been definitely elucidated. Whatever its nature, i.e. oxide or hydroxide or a complex of the metal being treated, it is beyond doubt that the fundamental action of electropolishing is based on the formation of a thin, solid film covering the metal. Its products of attack diffuse towards the interior of the solution. Conversely, the ions of the electrolyte are displaced similarly by diffusion, towards the surface of the anode. Consequently, above the film of oxide there is a liquid film of diffusion which is fairly viscous and which serves the object of preventing a localized attack which would rupture the oxide film; it maintains constant the speed of solution of the anode because this is solely controlled by diffusion and it conditions the levelling down of the metal surface. The diffusion is slower in the surface hollows which explains the more rapid solution of the surface prominences.

For successful electropolishing, all causes of localized destruction of the liquid diffusion film or of the oxide film must be avoided. There are several causes for such local destruction. The disengagement of oxygen on the anode can cause an irregular agitation of the liquid film. In certain cases, for example during the polishing of copper in phosphoric acid, the gas evolution can lead to pitting of the part. If the electropolishing bath is only slightly aggressive, it will be better to reduce by agitation the thickness of the liquid film because the solution of the oxide film is thus accelerated. The evolution of the gas occasions in itself an effective agitation which can be fairly regular when it

is vigorous. This would seem to be the explanation of polishing at a high current density. The hypothesis has been advanced that the formation of a gaseous film could also contribute to the micro-geometric selectivity of the solution of the metal. The field of application of this hypothesis could however be fairly limited.

One cause of destruction of the solid film is the presence of chlorine ions in the solution. These ions can cause a peptization of the film which serves to create a certain porosity and even, in extreme cases, a dispersion pure and simple in the solution. These ions can moreover modify radically the nature of the film. Thus, the film which is formed anodically on cadmium is normally the hydroxide while, in the presence of chlorine ions, it is constituted of a hydroxychloride of the type $Cd\ (OH)^x\ Cl^y$. It has been confirmed in actual fact that the addition of chlorides to any electropolishing solution renders the bath useless. There are, however, certain special cases which are exceptions where electropolishing is possible in chloride baths, for example in the case of nickel and magnesium. To obtain the optimum electropolishing conditions, certain fundamental factors need to be established and it is necessary to determine (1) The optimum composition of the bath, (2) The working temperature, (3) The conditions of agitation at the anode and (4) The electrical conditions of the electrolysis.

As soon as the composition of the bath has been fixed it is always possible to determine systematically the conditions of the electrolysis. It suffices, in order to achieve this, to plot the variations of the anodic potential as a function of the current density. On this curve there will always be observed a "polishing range." With simultaneous determination of the potential-current density curve at the boundaries of this range a technical means of control of the bath is obtained.

Improvement of Properties of Bright Nickel Baths by Means of Sulfurous Acid and Suffites

H. Komusaari; *Metalloberflaeche*, vol. 6, No. 11, pp. B162-B163.

The author encountered serious difficulties when putting a new bright nickel bath into operation in a tank lined with Neoprene. At the lower current density areas the nickel deposit was dark or missing altogether. Thus, for example, reflectors of about 20 cm. diameter and 10 cm. depth with an opening of about 4 cm. for the lamp, remained non-nickeled in the interior about 1-3 cm. around the lamp hole with a dark seam around the boundary of the nickel deposit. The remaining part of the reflector was nickeled in a satisfactory manner. After lengthy treatment of the acidified bath with a large cathode surface, precipitation with excess nickel carbonate and purification with activated carbon, the dark seam at the nickel boundary in the interior of the reflector disappeared, but the defect in the plating around the lamp hole remained as before. Purification with hydrogen peroxide and potassium permanganate gave no result and, on the contrary, the unplated area had even increased. The conception was then dealt with of treating with reducing agents and sulfites were selected as suitable media for the purpose. It was found that 5 grams of sodium sulfite per liter gave a startling result. The bath, which formerly gave about a 5 mm. wide non-nickeled edge at the cathode in the Hull cell, (at the zone of lowest current density), now plated the cathode perfectly. In addition, the back side of the cathode was nickeled. The brilliance of the plate, however, had deteriorated with the sulfite addition. The next step was to reduce the sulfite addition to the bath and it was established that amounts of 30 to 100 mg. of SO_2, in the form of sulfite, per liter of bath were sufficient to improve the throwing power of the bath without affecting the brightness of the deposit.

Since this work was done, regular additions of magnesium sulfite have been made to the 2,700 liter bath corresponding to 50-100 mg. SO_2 per liter about every two weeks according to requirement. The sufite addition is used up according to the demands on the bath and the throwing power suddenly deteriorates but is immediately regenerated after the sulfite addition. Magnesium sulfite was selected for the bath addition because no sodium salts are present in the composition of this compound and regular additions of free sulfurous acid would serve to lower the pH value of the bath. An addition of nickel sulfite would appear to be the most objective addition but magnesium sulfite is most readily obtained.

It was further established by means of the Hull cell test that the hydrogen adsorption was appreciably reduced with the aid of sulfite additions of the above order and similarly stresses in the nickel deposit, which can easily be tested by means of a thin strip cathode. Comparative tests were conducted with the bright nickel bath and a normal Watts type bath which contained a wetting agent, had been clear-filtered and, in spite of this, showed hydrogen porosity. It can be further accepted that the cathode current efficiency is improved and that the anode current efficiency on the other hand is reduced a little. A disadvantage of the sulfite addition is that this renders difficult the iron precipitation in the bath. If iron passes into the bath then the sulfite makes difficult the oxidation of this to the ferric form, so that a suspension is formed which is very difficult to filter off.

The author held the opinion that the nickel bath had been poisoned by some substance other than the Neoprene tank lining, which substance however could not be established by analysis. For a half year, no further brightening addition was given to the bath but the bath was merely regenerated with sulfite and the bath is now to be treated with activated carbon. Laboratory research has, in the meantime, shown that, when activated carbon is applied in the correct amount, in cases where the brightening addition has been reduced, improvement of the throwing power is obtained. The composition of the nickel bath used was: Nickel sulfate 200 g./l.; nickel chloride 40 g./l.; magnesium sulfate 35 g./l.; boric acid 25 g./l.; and in addition, saccharine, brightening addition and wetting agent. The anodes were hung in bags of polyvinylchloride plastic material. A smaller bath prepared in accordance with the above findings, worked perfectly satisfactorily.

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L. Meunier; *Galvano* (Paris), vol. 21, No. 188, pp. 15-19.

Users of electropolishing procedures often find themselves confronted with complex problems because each industrial application represents a particular case for which it is necessary to find the most favorable solution while finding simultaneously a satisfactory solution to the numerous other technical and commercial considerations involved. Up to comparatively recently there was practically no method of systematic research into the fundamental conditions of electropolishing techniques and empiricism reigned supreme. If, for example, it was a question of electropolishing a particular alloy, an attempt was made to approach a suitable bath by successively correcting a bath composition which had been found suitable for the treatment of the main pure constituent of the alloy or of an alloy of approximating composition.

The choice of an electropolishing bath is limited as there are only two main groups available, those based on concentrated phosphoric acid and those based on perchloric acid, without mention of the cyanide baths whose field of application is very limited. But within the framework of these two main groups a multitude of formulas are encountered which mostly only serve for the electropolishing of one single metal. Although there is considerable diversity of thought regarding the electropolishing procedure, certain pertinent questions appear to have been definitely elucidated. Whatever its nature, i.e. oxide or hydroxide or a complex of the metal being treated, it is beyond doubt that the fundamental action of electropolishing is based on the formation of a thin, solid film covering the metal. Its products of attack diffuse towards the interior of the solution. Conversely, the ions of the electrolyte are displaced similarly by diffusion, towards the surface of the anode. Consequently, above the film of oxide there is a liquid film of diffusion which is fairly viscous and which serves the object of preventing a localized attack which would rupture the oxide film; it maintains constant the speed of solution of the anode because this is solely controlled by diffusion and it conditions the levelling down of the metal surface. The diffusion is slower in the surface hollows which explains the more rapid solution of the surface prominences.

For successful electropolishing, all causes of localized destruction of the liquid diffusion film or of the oxide film must be avoided. There are several causes for such local destruction. The disengagement of oxygen on the anode can cause an irregular agitation of the liquid film. In certain cases, for example during the polishing of copper in phosphoric acid, the gas evolution can lead to pitting of the part. If the electropolishing bath is only slightly aggressive, it will be better to reduce by agitation the thickness of the liquid film because the solution of the oxide film is thus accelerated. The evolution of the gas occasions in itself an effective agitation which can be fairly regular when it

is vigorous. This would seem to be the explanation of polishing at a high current density. The hypothesis has been advanced that the formation of a gaseous film could also contribute to the micro-geometric selectivity of the solution of the metal. The field of application of this hypothesis could however be fairly limited.

One cause of destruction of the solid film is the presence of chlorine ions in the solution. These ions can cause a peptization of the film which serves to create a certain porosity and even, in extreme cases, a dispersion pure and simple in the solution. These ions can moreover modify radically the nature of the film. Thus, the film which is formed anodically on cadmium is normally the hydroxide while, in the presence of chlorine ions, it is constituted of a hydroxychloride of the type $Cd\ (OH)^x\ Cl^y$. It has been confirmed in actual fact that the addition of chlorides to any electropolishing solution renders the bath useless. There are, however, certain special cases which are exceptions where electropolishing is possible in chloride baths, for example in the case of nickel and magnesium. To obtain the optimum electropolishing conditions, certain fundamental factors need to be established and it is necessary to determine (1) The optimum composition of the bath, (2) The working temperature, (3) The conditions of agitation at the anode and (4) The electrical conditions of the electrolysis.

As soon as the composition of the bath has been fixed it is always possible to determine systematically the conditions of the electrolysis. It suffices, in order to achieve this, to plot the variations of the anodic potential as a function of the current density. On this curve there will always be observed a "polishing range." With simultaneous determination of the potential-current density curve at the boundaries of this range a technical means of control of the bath is obtained.

Improvement of Properties of Bright Nickel Baths by Means of Sulfurous Acid and Suffites

H. Komusaari; *Metalloberflaeche*, vol. 6, No. 11, pp. B162-B163.

The author encountered serious difficulties when putting a new bright nickel bath into operation in a tank lined with Neoprene. At the lower current density areas the nickel deposit was dark or missing altogether. Thus, for example, reflectors of about 20 cm. diameter and 10 cm. depth with an opening of about 4 cm. for the lamp, remained non-nickeled in the interior about 1-3 cm. around the lamp hole with a dark seam around the boundary of the nickel deposit. The remaining part of the reflector was nickeled in a satisfactory manner. After lengthy treatment of the acidified bath with a large cathode surface, precipitation with excess nickel carbonate and purification with activated carbon, the dark seam at the nickel boundary in the interior of the reflector disappeared, but the defect in the plating around the lamp hole remained as before. Purification with hydrogen peroxide and potassium permanganate gave no result and, on the contrary, the unplated area had even increased. The conception was then dealt with of treating with reducing agents and sulfites were selected as suitable media for the purpose. It was found that 5 grams of sodium sulfite per liter gave a startling result. The bath, which formerly gave about a 5 mm. wide non-nickeled edge at the cathode in the Hull cell. (at the zone of lowest current density), now plated the cathode perfectly. In addition, the back side of the cathode was nickeled. The brilliance of the plate, however, had deteriorated with the sulfite addition. The next step was to reduce the sulfite addition to the bath and it was established that amounts of 30 to 100 mg. of SO_2, in the form of sulfite, per liter of bath were sufficient to improve the throwing power of the bath without affecting the brightness of the deposit.

Since this work was done, regular additions of magnesium sulfite have been made to the 2,700 liter bath corresponding to 50-100 mg. SO_2 per liter about every two weeks according to requirement. The sufite addition is used up according to the demands on the bath and the throwing power suddenly deteriorates but is immediately regenerated after the sulfite addition. Magnesium sulfite was selected for the bath addition because no sodium salts are present in the composition of this compound and regular additions of free sulfurous acid would serve to lower the pH value of the bath. An addition of nickel sulfite would appear to be the most objective addition but magnesium sulfite is most readily obtained.

It was further established by means of the Hull cell test that the hydrogen adsorption was appreciably reduced with the aid of sulfite additions of the above order and similarly stresses in the nickel deposit, which can easily be tested by means of a thin strip cathode. Comparative tests were conducted with the bright nickel bath and a normal Watts type bath which contained a wetting agent, had been clear-filtered and, in spite of this, showed hydrogen porosity. It can be further accepted that the cathode current efficiency is improved and that the anode current efficiency on the other hand is reduced a little. A disadvantage of the sulfite addition is that this renders difficult the iron precipitation in the bath. If iron passes into the bath then the sulfite makes difficult the oxidation of this to the ferric form, so that a suspension is formed which is very difficult to filter off.

The author held the opinion that the nickel bath had been poisoned by some substance other than the Neoprene tank lining, which substance however could not be established by analysis. For a half year, no further brightening addition was given to the bath but the bath was merely regenerated with sulfite and the bath is now to be treated with activated carbon. Laboratory research has, in the meantime, shown that, when activated carbon is applied in the correct amount, in cases where the brightening addition has been reduced, improvement of the throwing power is obtained. The composition of the nickel bath used was: Nickel sulfate 200 g./l.; nickel chloride 40 g./l.; magnesium sulfate 35 g./l.; boric acid 25 g./l.; and in addition, saccharine, brightening addition and wetting agent. The anodes were hung in bags of polyvinylchloride plastic material. A smaller bath prepared in accordance with the above findings, worked perfectly satisfactorily.

Shop Problems

Abrasive Methods—Surface Treatments—Contro
Electroplating—Cleaning—Pickling—Testing

METAL FINISHING publishes, each month, a portion of the inquiries answered as a service to subscribers. If any reader disagrees with the answers or knows of better or more information on the problem discussed, the information will be gratefully received and the sender's name will be kept confidential, if desired.

Non-Toxic Silver De-Tarnishing

Question: To de-tarnish silver, we have ordered a large amount of "Soil-ax," which in our steam heated steel tank won't work, even with aluminum bars. Will you please let me know of a powder to be dissolved that will de-tarnish? We cannot use cyanides here.

F. M.

Answer: A conducting salt which will be suitable for de-tarnishing silver by the aluminum contact method is soda ash or washing soda, in concentration of about 2 oz./gal. Trisodium phosphate will also be suitable.

Ball Burnishing Brass

Question: We are interested in ball burnishing small brass jewelry parts which we make. We have a sheet brass burnishing barrel and 3/16 steel balls with which we have successfully finished silver, gold, and steel parts, and we would like to make our own compound for brass.

Could you provide us with a formula or at least suggest what brightening agent we should add to our soap when running copper or brass?

J. B. N.

Answer: Ordinarily we would suggest that you use soap only in your burnishing barrel for brass. However, if you have hard water, any of the large number of softeners and squestering agents can be added, also a small amount of sodium cyanide.

We would not be able to suggest any particular formula since the operating conditions and type of water supply will affect the results. It is suggested that you communicate with local suppliers of burnishing compounds.

Brush Plating Kits

Question: We would like to obtain information on brush cadmium plating. If available, please advise the name of a manufacturer of portable brush plating kits to be used for touch-up on reworked parts that had previously been cadmium plated.

W. J. W.

Answer: There are a number of manufacturers of brush plating equipment but we have not made a list of them. Warner Electric Co., of Chicago, is one.

Many large hardware stores carry such kits. If you do not have any success locally, write to Patterson Bros., 15 Park Row, New York, N. Y.

Spongy Tin Deposits

Question: I notice in plating tin (sodium stannate), that when small parts are being plated the operators use one of the tin anodes at times for a "Robber." Would this be detrimental in time if this same "Robber" were used continuously as an anode?

Also, is it correct to unload the anodes first before taking the work out. What happens when anodes are left in the tank without current? Please explain fully as we are experiencing some trouble, mostly spongy deposits when building up. The flash is all right.

If old tin is properly cleaned, is it advisable to plate over, or is stripping necessary?

A. W. M.

Answer: There is no objection to using a tin anode as a "robber," as the deposit is pure tin. After use, the "robber" can be returned to the anode rod.

When tin anodes are left in the tank with the current off, the greenish-yellow polarization film is dissolved by the caustic in the solution. If this film is not reformed before beginning to plate again, the tin dissolves from the anodes in the stannous form instead of the stannic, resulting in spongy deposits. Addition of hydrogen peroxide or sodium perborate will oxidize the stannous ions in the solution but the effect will be only temporary unless the anodes are filmed.

It is not necessary to strip tin plated work before replating if the tin is properly cleaned.

Paint Adhesion to Galvanized Pipe

Question: In our production we cut and thread galvanized steel pipes which are bent into 90° bends. During the course of the bending operation on a percentage of these bends the galvanizing flakes. We wish to process these further by black enameling them after wire brushing off the loose flakes of zinc. We were advised to etch the galvanizing in order for the enamel to adhere. We were told that a 10% solution of muriatic acid or of copper sulfate would do this operation quickly.

S. W.

Answer: Since you process the pipe by black enameling, we would suggest that you use a phosphate conversion coating to improve adhesion to the zinc base. Unlined steel tanks can be used for cleaning and rinsing and also for the phosphating treatment. The cleaner and phosphate tanks will require heating.

There are combination cleaning and phosphating dips available from suppliers, which may be used cold and then rinsed off. On pages 517 and 518 of the 1953 edition of the Metal Finishing Guidebook you will find a list of manufacturers of alkaline cleaners, most of whom will be in a position to furnish you with suitable materials, together with information as to equipment required.

Brass Plating for Rubber Adhesion

Question: The other day we had an inquiry from a client regarding brass plating of steel rims for heavy duty automobiles. The brass deposit is intended to bond a subsequent rubber layer to the steel and thus should have a fixed relation Cu/Zn. The rims have a diameter of 540 mm and a width of 110 mm. Required capacity: 2 — 4 rims per hour.

Our problem is confined to the method used to insure a homogenious brass deposit with the required characteristics for perfect adherence.

H. C. Q.

Answer: Adhesion of rubber to steel requires prior deposition of only a thin brass deposit but the deposit must have a copper to zinc ratio of 70:30.

A solution suggested by H. P. Coats at the 1936 convention of the American Electroplaters' Society contained the following:

Copper cyanide — 3 oz/gal
Zinc cyanide — 2 "
Sodium cyanide — 6 "

Adjust pH to about 10.7 with caustic soda and sodium bicarbonate. Temp. 85-95° F., 8-10 amp/sq. ft. Use 70:30 brass anodes with an anode current density of not more than 4 amp./sq/ft. and agitate the solution mechanically.

Conducting Plastic

Question: In your 21st annual Guidebook-Directory we noticed at the end of page 380 the following lines:

"Another recent development is the manufacture of a new class of conductive plastics material which makes possible the molding of plastic forms, etc. . . ."

Could you send us some more precise information on this subject: properties and data, advertisements or addresses of manufacturers, working conditions, etc.

Where could we obtain the paper, "Plastics can be Electrical Conductors"—Staff Report, Electrical Manufacturing, November, 1949?

M. S. A.

Answer: A castable resin which conducts current and can be readily plated is obtainable from the Atlas Mineral Products Co., 42 Walnut St., Mertztown, Pa. The product is known as "Conductoplast."

The magazine "Electrical Manufacturing" is published by Gage Publishing Co., 1250 Sixth Ave., N.Y.C.

Anodes for Chromium Plating

Question: I would like to ask a few questions regarding the lead anodes for chromium plating.

I am presently using anodes made of ordinary lead, 3/8" thick and 3" in width. These anodes after several weeks use start to scale and it is not uncommon to have pieces of scale the width of the anode fall from it. Will the use of either tin-lead or antimony-lead anodes prevent this scaling or burning up that I am now experiencing with ordinary lead?

When tin or antimony lead are used as anodes, is a small amount of either the tin or the antimony co-deposited with the chromium?

P. B. G.

Answer: Ordinary chemical lead should be satisfactory as a chromium plating anode. Scaling is probably lead chromate, indicating improper operation or solution composition. The anodes should be chocolate brown in color.

When using tin-lead or antimony-lead anodes, none of the anode material will be found in the deposit.

Water Removal

Question: We have a job in our plant known as a "Drawer Puller," which is die cast with screw holes drilled in each end. We brass plate these pieces then scratch brush, followed by a lacquering process. At present we have to wipe the parts to remove water prior to lacquering. We would like to know what recommendation you might give us in regard to some type of solution to remove water from parts so that we can speed up our lacquering process.

E. C. H.

Answer: Your parts can be dried in an oven at a temperature below about 225° F. to prevent tarnishing. A water displacing compound may also be used, followed by vapor degreasing. This is very common practice and materials are obtainable from most supply houses.

Patents

Recently Granted Patents in the Metal Finishing Field

Electrodeposition of Chromium

U. S. Patent 2,630,407. *March 3, 1953. N. Hackerman, assignor to Research Corp.*

The method of electrodepositing bright, smooth, adherent films of chromium upon a cathodic workpiece which comprises immersing the cathodic workpiece in an aqueous solution of chromic acid and sulfuric acid containing from about 14 to about 16 parts of indium sulfate to each 100 parts of chromic acid and passing an electric current through said solution between the cathodic workpiece and an anode immersed in said solution.

Metallizing Apparatus

U. S. Patent 2,631,565. *March 17, 1953. J. A. Sargrove, assignor to Sargrove Electronics Ltd.*

A metallizing apparatus for the metallization of articles comprising a pair of spaced cubicles, a conveyor extending through openings in said cubicles provided in opposite walls of each cubicle and adapted to convey articles to be metallized through said cubicles in succession, a metallizing spray device disposed exteriorly of each cubicle to one side of said conveyor, said spray devices being carried at the opposite ends of a common support pivotally mounted intermediate its ends for oscillatory movement back and forth along a path transverse to the direction of movement of said conveyor, the wall of each cubicle adjacent the spray device associated therewith including an elongated slot disposed in the path of travel of the spray device, and means producing a flow of air through each cubicle.

Method and Apparatus for Gas Plating

U. S. Patent 2,631,948. *March 17, 1953. H. G. Belitz and O. F. Davis, assignors to The Commonwealth Engineering Co. of Ohio.*

The method of plating a steel cylindrical shaft which comprises rotating said shaft, providing a protected surface area of said shaft where inert gas atmosphere prevents ingress of air to the plating area, heating said shaft to a temperature in the range of 350°F. to 425°F., impinging in a given direction upon said heated surface area a vapor stream consisting of carbon dioxide and nickel carbonyl, and removing the carbon dioxide and nickel carbonyl decomposition products under conditions to maintain mixing of air into the exhaust stream to a minimum, said removal taking place in a direction opposed to that of said given direction.

Corrosion Coatings

U. S. Patent 2,631,951. *March 17, 1953. A. E. Chester, assignor to Poor & Co.*

A process of coloring zinc and of protecting it against corrosion which comprises treating a zinc surfaced article with an amount of an aqueous solution consisting essentially of chromic acid, ammonium persulfate and trifluoroacetic acid sufficient to form a uniform bronze colored film on said article.

Rust Inhibiting Composition

U. S. Patent 2,632,709. *March 24, 1953. K. F. Schiermeier and P. W. Jones, assignors to Shell Development Co.*

A rust-inhibiting composition of matter consisting essentially of the following constituents in the following proportions:

	Per cent by weight
Oxidized wax hydrocarbon	40-60
Higher aliphatic carboxylic acid containing at least 10 carbon atoms per molecule	0.25-5
Light liquid petroleum stock boiling below 650°F.	Balance

Brightener for Acid Zinc

U. S. Patent 2,632,728. *March 24, 1953. A. E. Chester, assignor to Poor & Company.*

A composition for use in a zinc sulfate plating bath consisting essentially of a water soluble lignin sulfonate, dark molasses and trifluoroacetic acid, said composition when added in sufficient amount to an acid zinc sulfate plating bath being capable of producing a bright zinc plate by electrodeposition directly from said bath.

Silver Tarnish Removal

U. S. Patent 2,632,730. *March* 24, 1953. *L. Brannan.*

A process for cleaning silver articles by galvanic action which comprises agitating silver articles in contact with the interior of a rotating zinc drum, said drum containing a solution consisting of water, salt and soap, the said soap being insoluble and present in the form of globules, whereby tarnish is removed from the said silver by galvanic action and burnished by contact with the said soap globules.

Method and Apparatus for Wet Grit Blasting

U. S. Patent 2,632,980. *March* 31, 1953. *N. Ransohoff, assignor to N. Ransohoff, Inc.*

An apparatus for wet blasting work pieces with grit particles which are incapable of suspension in liquid in the absence of movement comprising; a chamber, a grit projector in the chamber adapted to propel a stream of grit and liquid against the work pieces at blasting velocity, the chamber being adapted to receive the grit particles and liquid discharged by the projector, conveyor means in the chamber adapted to feed grit particles from the chamber, at a controlled rate and a pump adapted to receive said grit particles and liquid from the chamber and to propel the mixture to the projector at a velocity sufficient to maintain the grit particles in dynamic suspension in the liquid but insufficient to perform the blasting operation.

Grinding and Polishing Machine

U. S. Patent 2,632,981. *March* 31, 1953. *L. Kniep, Jr.*

A surfacing and polishing machine comprising first and second rollers, an

endless work engaging belt carried by said rollers, a first support disposed with one end up and the other end down, a second support disposed with one end up and the other end down, said first and second rollers being carried by the upper end portions of said first and second supports, respectively, a base, means pivotally supporting the lower end portion of said first support on said base, and means pivotally supporting said second support on said first support with the lower end portion of said second support in engagement with said base.

Dust Collector

U. S. Patent 2,633,206. *March* 31, 1953. *W. Bruckner, assignor to The Northern Blower Co.*

In a dust collector, the combination of a series of individual compartments, a set of fabric filtering bags in each compartment, a hopper below the various bags with which the interior of the bags communicate, mechanism in each compartment for movably supporting the upper ends of the bags and adapted to be operated to shake them, a separate control device submitted to the air pressures on the interior and exterior of the bags in each compartment, and means whereby the operation of such shaking mechanism in each compartment is selectively controlled by the differential pressure in the corresponding control device when it reaches a pre-determined amount.

Anode Bag

U. S. Patent 2,633,452. *March* 31, 1953. *G. B. Hogaboom, Jr. and N. R. Hall.*

In combination, a fabric strainer bag for enveloping an electroplating anode having a suspension hook projecting from its end, said bag having an open mouth defined by a hem, the outer wall of the bag mouth hem having openings longitudinally spaced apart a distance approximating at least half the circumference of the bag, and a non-resilient, pliantly deformable metallic member extending through the hem interior between said openings, with opposite end portions of said member respectively projecting through said respective openings exteriorly of the hem, said member being adapted to be releasably bent around the shank of the anode suspension hook so as to gather the mouth of the bag about said shank above the top end of the anode, whereby to detachably secure said bag about the anode in suspended enclosing relation thereto.

Tin and Tin Alloy Plating Bath

U. S. Patent 2,633,450. *March* 31, 1953. *J. W. Andrews, assignor to United States Steel Corp.*

A bath for the electrodeposition of tin comprising an aqueous acid solution of tin, said acid being selected from the group consisting of hydrofluoboric acid, phenolsulphonic acid, sulphuric acid, and mixtures of the last two named acids, and, as an addition agent, an effective amount of a mixture consisting of 60 to 85% by weight 4-4′ dihydroxy diphenyl sulphone and 40 to 15% 2-4′ dihydroxy diphenyl sulphone; said effective amount being between 50 and 100% of said mixture's maximum solubility in said bath.

Iron-Containing Base Coated with Nickel-Phosphorus Alloy

U. S. Patent 2,633,631. *April* 7, 1953. *G. J. Horvitz, assignor to G. Brinton Jack, Jr.*

A base body made of metal containing iron and having a surface coating which consists substantially of a binary alloy of nickel and phosphorus, the proportion of phosphorus being substantially two per cent, the inner face portion of said coating having a high-

er percentage of phosphorus than the outer face portion of said coating, said body and said surface coating have an intermediate zone which consists substantially of a ternary alloy of nickel and phosphorus and of the ferrous metal of said base body.

Facing Sheet for Machine Sanding with Coated Abrasives

U. S. Patent 2,633,679. *April* 7, 1953. *B. S. Cross and R. S. Frigstad, assignors to Minnesota Mining & Mfg. Co.*

In machine sanding apparatus including a plurality of pulleys, an abrasive-coated belt trained about said pulleys, and means for causing said abrasive-coated belt to travel about said pulleys; an accessory having a pressing face adapted to press the traveling abrasive-coated belt against a work piece, the pressing face of said accessory being provided with a friction-reducing surface comprising a multitude of minute, substantially equal-sized, hard, smooth surfaced spheroidal protuberances uniformly distributed over said pressing face, the total number of said spheroidal protuberances forming a discontinuous low-friction surface for contacting the back side of the traveling abrasive coated belt.

Brightening and Passivating Solution

U. S. Patent 2,634,224. *April* 7, 1953. *A. W. Faucher, assignor to Underwood Corp.*

A solution for use in brightening and passivating the surface of zinc or cadmium articles consisting of an aqueous solution composed of 50 to 300 grams of chromic acid per liter of solution, 3 to 24 grams of sulphuric acid per liter of solution, 25 to 66⅔% as much ortho-phosphoric acid as sulphuric acid, and sufficient nitric acid to prevent the surface from streaking.

Self-Cooling Buffing Wheel

U. S. Patent 2,633,680. *April* 7, 1953. *S. Goldberg.*

A spacer plate for an assembly of buff rings, comprising a sheet material disk portion having a central bore to receive a spindle, an annular supporting means spaced outwardly from and concentrically with said central bore to form an annular support for a buff ring, said disk portion having a vane struck out therefrom at an oblique

inclination to form an impeller overlying an aperture, said inclined vane being disposed on said disk portion to impel ventilating fluid both axially and radially of the spacer plate, said supporting means having radially extending air flow passages formed therein to pass the radially directed fluid to the buffing ring, said vaned disk portion forming a stage of a multistage axial compressor for a buffing ring assembly.

Plating Tank Structure

U. S. Patent 2,634,878. *April* 14, 1953. *W. Messinger and D. B. Lytle, said Lytle assignor to Time, Inc.*

A plating tank comprising a plurality of tank sections, means supporting the tank sections in spaced, axial alignment with one another, the adjacent spaced ends of the tank sections being undercut when viewed from the interior of the tank, a liner in each tank section, the liners being of a deformable material inert to plating solutions and being mounted in abuting end to end relationship, and band sealing means peened between the spaced undercut ends of the tank sections and overlapping the abuting ends of the liners, the sealing means being of the same inert material as the liners, in locking engagement with the spaced undercut ends of the tank sections and fused to the abutting ends of the liners.

Fused Salt Bath Cleaning

U. S. Patent 2,635,062. *April* 14, 1953. *R. Dunlevy, H. Frick and J. H. Shoemaker, assignors to Kolene Corp.*

The combination, in apparatus for cleaning the surfaces of metal strip by passing the same through a liquid bath comprising molten alkali metal salts containing an oxidizing agent reactable with graphitic carbon, of a tank containing said molten alkali metal salts, and of at least one guide roller mounted in said tank to contact said molten alkali metal salt bath for directing the continuous passage of metal strip to be cleaned into and out of said bath, said guide roller being formed of cast iron having a normal content of graphitic carbon which has been fissured by reaction with the oxidizing component of said bath whereby the surface of said fissured cast iron by removal of said carbon entrains in said fissures the molten salt of said bath as a non-abrading lubricating film about said said roll in guiding non-abrasive contact with said metal strip.

Recent Developments

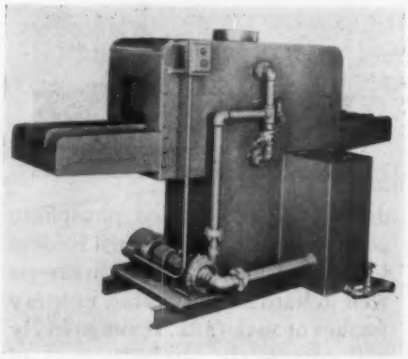
New Methods, Materials and Equipment for the Metal Finishing Industries

Small Power Washing Machine

G. S. Blakeslee & Co., Dept. MF, 1844 S. 52nd Ave., Cicero 50, Ill.

The manufacturers offer a standard small power washing machine designed for low production jobs or for cleaning between operations. A standard unit, tank and tables are so arranged that two units can be teamed together for a wash-and-rinse operation. It is equipped with a wheel roller conveyor, designed for standard work baskets, and incorporates all the quality features found in the more expensive high-production conveyorized-power washing machines.

This same unit can be furnished with the special paddle wheel instead of a pump. This arrangement is ideal for screw machine work, where a great amount of chips is to be removed and



the job calls for a large solution volume at a low head. This standard unit can be furnished for steam, gas or electric heat. In addition to all this flexibility the unit can be furnished in explosion-proof construction for use with petroleum solvents.

Heavy Duty Chemical-Resisting Protective Coatings

United Chromium, Inc., Dept. MF, 100 East 42nd St., New York 17, N. Y.

New formulations which can be spray-applied to produce extra-thick chemical-resisting coatings on steel and other metals have been developed. These products, identified as Unichrome 5300 coatings, are used to protect equipment against acids, alkalies, salts, oxidizing agents, and many other corrosives.

These coatings permit spray application of films of much greater thickness than has been obtainable in the past. Used at room temperature, they can be applied to cold vertical surfaces to produce single coat dry films up to 20 mils thick. Even at these unusual thicknesses practically no sagging is encountered. Materials previously offered for similar applications usually provided single film dry thickness of about 1 mil, seldom more than 6 mils.

Strong mineral acids such as hydrochloric and sulfuric, alkalies such as sodium and potassium hydroxides, water, salt solutions, oxidizing and reducing agents, and many wetting agents do not attack the coatings. Special formulations can be supplied that are odorless, tasteless, and non-toxic, making them suitable for use in contact with edible products.

The coatings are usually applied over a special primer. Both the primer and the coating require short bakes at a temperature of 350°F. The coatings cannot be air-dried.

In the short time they have been available, the coatings have been used for tank and duct lining work in the plating industry. The manufacturer states that the coatings may be used to protect many other types of equipment in the chemical, pharmaceutical, metal working, food, and beverage industries.

Further information may be had by writing to the above address.

Heat Exchangers with Graphite Tubes

The Industrial Filter & Pump Mfg. Co., Dept. MF, 5900 West Ogden Ave., Chicago 50, Ill.

The above company announces that their line of heat exchangers is now available with impervious graphite tubes in addition to the variety of metal tubes previously used. The

graphite tubes can be had in both the tube-and-shell type and the tube-bundle type heat exchangers. By combining any number of tubes, Industrial heat exchangers can be supplied to meet any heat-transfer area requirement. The company also states that now with a choice of graphite and metal tubes they can offer a heat exchanger ideally suited to heating and cooling any solution used in pickling rooms, any plating solution, and any solution heating and cooling requirement in the processing industries.

Chromium Recovery Process

Barnstead Still & Sterilizer Co., Dept. MF, 170 Lanesville Terrace Forest Hills, Boston 31, Mass.

The removal or recovery of chromic acid from rinse water is a recent development which is of interest to platers. The company has developed a process whereby rinse water can be passed through ion-exchange resins to effect nearly 100% chrome recovery. The advantages to the plating shop are twofold. First, the troublesome chromic acid waste disposal problem is eliminated. Second, the expensive and often scarce chromic acid is recovered for reuse.

In the process, the rinse water is first passed through a cation column to remove aluminum and copper and then through an anion resin bed which removes the chromic acid. The chromic acid is then recovered in the regeneration process. Tests show that the same resins can be used economically for

100 or more cycles. In most instances, savings in chromic acid will more than repay the operating costs of the entire process, which means that the waste disposal problem can be solved at no cost. In addition, as a by-product of the process, the user obtains a supply of demineralized water which he can use to good advantage in rinse tanks and solutions.

Automatic Steam Cleaner

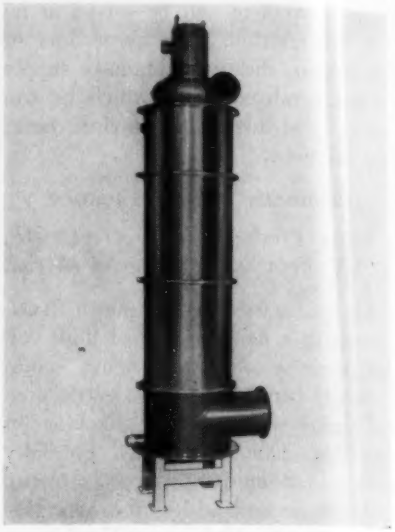
Kelite Products, Inc., Dept. MF, 1250 N. Main St., Los Angeles 12, Cal.

Automatic firing is the major development in a newly designed high volume steam cleaner now being manufactured. Turning on two electric control switches places the machine in operation. One controls a specially designed automotive piston-type pump, while the second ignites the non-clogging automatic oil burner. The burner uses a wide range of fuels, from gasoline to number two diesel fuel without changing orifices or burner parts. Another feature results in substantial fuel savings by trapping radiated burner heat to raise the water temperature 50° before it enters the heating coil. Other automatic controls safeguard the new steam cleaner by (1) turning off the burner if water supply fails, and (2) preventing the burner from being fired unless pump is in operation.

The new Model K15-A has a capacity of 150 gallons per hour. The machine measures approximately 55″ long, 27″ wide, 48″ high, and weighs 825 lbs. It is delivered complete with 25′ of seven-ply alkali protected steam hose, with safety fittings, an Aerated-Grip steam gun (which permits working without gloves), and a Hy-Vel heavy duty nozzle. When fuel and solution tanks are filled, the machine can be operated continuously for eight hours without refilling or refueling.

Fume Washing Tower

The U. S. Stoneware Co., Dept. MF, Akron, O.



The above manufacturer has announced the development of a compact, portable, yet high performance fume washing tower for general laboratory and industrial use.

The fume washer consists of a metal stand on which the tower is supported; a bottom section containing a packing support plate, liquor drain pipe and fume intake duct; one, two, or more packed intermediate sections; a distributor section with water inlet; and a top section containing the exhaust fan, drive motor, and washed air exhaust duct. The unit is made in two standard sizes respectively: 20″ tower diameter, which with two intermediate packed sections is 8′ 5″ in height, and 30″ tower diameter, which is 9′ 7″ tall with two intermediate sections. The 20″ unit is powered with a 1 HP, 60 cy., 220-440/v 3-phase motor, and has a rated capacity of 750 CFM of air. The 30″ unit is powered with a 2 HP, 60 cy., 220-440/v 3-phase motor, and has a rated capacity of 1650 CFM of air. The washer comes complete with motor unit, and sufficient Intalox saddle packing for the number of intermediate tower sections ordered.

In operation, fume-laden air is drawn into the tower through the large air intake, and sucked up through the intermediate sections filled with Intalox Saddle packing. Water admitted at normal city line pressure is sprayed over the packing by the spraytight distributor. As air rises in the tower, it is scrubbed thoroughly by the descending water which absorbs the fume con-

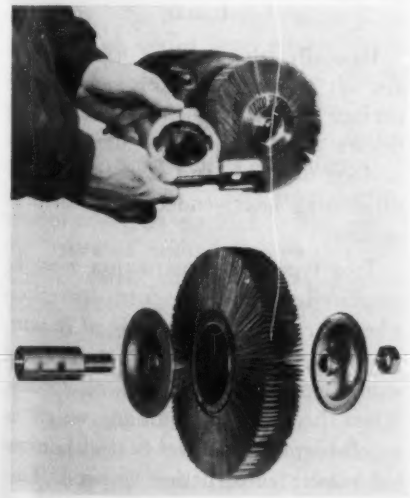
tent. Washed air discharging from the top exhause duct is released into the room directly, or through suitably prepared duct work. Waste water leaves the tower through the drain.

Flexible Grinding Wheel

Merit Products, Inc., 14023 Irving Place, Culver City, Cal.

An entirely new principle for light grinding and metal finishing is being introduced by the above company. The new tool, known as Grind-O-Flex, is a flexible grinding wheel which consists of hundreds of individual abrasive cloth leaves sealed to a hard core. As the wheel rotates it presents a continuous abrasive surface to metal parts. It is designed to smooth surfaces and remove flaws from contours without the danger of digging into the stock, which occurs when using hard grinding wheels, drums, belts, etc.

The wheel is 6½ inches in diameter, one inch wide and is available in a variety of grits from coarse to very fine. It may be used stationary or portably for all types of light grinding and deburring on irregular surfaces. No skill is required to obtain excellent results. It is extremely simple to set up and operate. A mounting arbor is provided for attaching the wheel to any standard plain or threaded shaft or for chucking in ¼" or ½" chucks. Flanges, which are held securely in place against the wheel by a single nut, are also provided. Arbor and flanges may be used repeatedly, only the wheel need be replaced when worn.



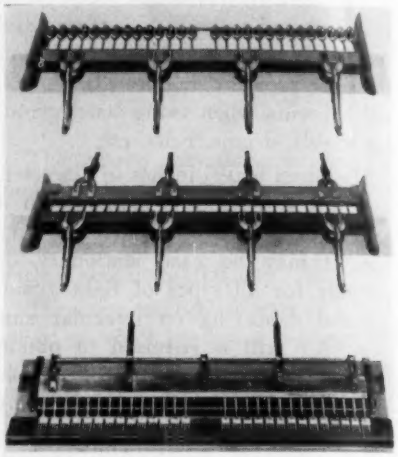
The wheel attaches to any rotating spindle (motor shaft, lathe, drill press, portable drill, flexible shaft, etc.). No special setups or equipment is neces-

sary. It is light in weight, (8 oz.). One-sixth HP motor is sufficient for normal purposes.

Polishing Jigs

Clair Mfg. Co., Inc., Dept. MF, 1009 S. Union St., Olean, N. Y.

A new group of jigs and fixtures for the mechanical holding of parts being surface finished has been introduced. Designed for use with Clair surface finishing machines, the group includes work holders and layout jigs. Primarily, they are used for holding items such as silverware, but they can be adopted for holding hand tools and other products.



(TOP) This type of work holder facilitates surface finishing of spoon bowls, fork tines, etc.

(CENTER) To avoid costly rehandling between surface finishing operations, batches may be transferred from one rack to another by means of positioning jigs.

(BOTTOM) Layout jigs, which often are called pre-loaders, assure accurate and rapid loading of racks.

Basically, the holding fixtures consist of: a framework for mounting in surface finishing machine, a clamping device for holding the items to be surface finished, and a provision for supporting heavy-ended items such as spoons.

Two types of construction may be employed. For heavy-duty operations where structural strength is of importance, they are made of steel-braced aluminum, with a weight of 15 lbs. When the need for minimum weight is a consideration, a steel-braced laminated plastic construction is used. This type weighs 10 lbs.

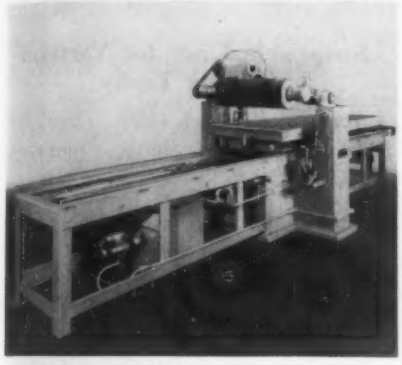
The holding jigs employ adjustable quick-acting, centerpoised, eccentric clamps with thumb-pressure cam re-

leases. The gripping surfaces are made of inlaid strips of rubber to permit the slight floating action essential in many surface finishing applications. Rubber with a Durometer reading of 45 is suitable for most items, but may be varied as required. On applications surface finishing silver and silver-plate where sulfur content causes discoloration or where high resistance to petroleum products is important, synthetics may be used instead of rubber.

Since the clamps are adjustable to a range of open and closed positions, a standard rack is capable of handling a variety of parts. If dimensions of items exceed normal holding range, modifications can be made at the time of fabrication.

Horizontal, Multi-Purpose Polishing Machine

The Central Machine Works, Dept. MF, Worcester, Mass.



The above manufacturer announces a new series of horizontal polishing machines to their line of hydraulically operated, multi-purpose machines, the H-M Series machines for polishing extrusions, sheets and rods as well as smaller and odd-shaped pieces. It is made in standard sizes from 7 ft., to 21 ft., stroke.

The new central horizontal series permits the polishing of extrusions and sheets the entire length, from beginning to end. The machine is hydraulically operated with provision for obtaining dwell during the polishing action, and has an adjustable stroke with stepless increments from 2 inches up to the full capacity of the machine. The horizontal machines are equipped with the justly famous hydraulic contour device so successful for many years on Central vertical polishing machines. Contour cams are made of plywood and may be made up as needed, quickly and inexpensively.

The turn of a valve will oscillate the

table across the face of the polishing roll during the stroke. The H-M series may be equipped with a mechanical, polishing compound applicator or spraying equipment as required. The series are standardized in sizes to take work from 6 ft., long to 20 ft. long.

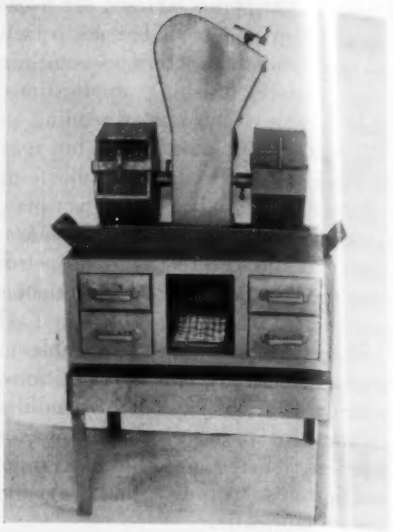
Bench Model Tumbling Barrels

Tumbling Sales & Service Co., Dept. MF, King St., Greenwich, Conn.

The latest additions to the Esbec line of tumbling equipment include the twin bench tumbling barrel, which is ideal for high production tumbling of all types of small pieces, from electronic parts and surgical needles to washers, screw machine products and other parts. It offers such a wide choice of drum sizes, weight capacities, types of drive and speeds that the customer can practically design a unit to his own specifications.

Built for either abrasive tumbling or ball burnishing, its extra heavy construction will stand the gaff of continuous operation. Its drums are quickly removable if it is desired to transfer them to a sink for rinsing or separation of load.

A self-contained, watertight tumbling bench is available for the Esbec Twin. This unit provides built-in separating drawers and a water outlet which can



be hooked up to any drain. For those plants where disposal of water is a problem, this tumbling bench is a truly practical answer. It is also a very practical piece of equipment for production tumbling departments.

Strippable Liner for Vacuum Coating Tanks

National Research Corp., Dept. MF, Seventy Memorial Drive, Cambridge 42, Mass.

The company now offers a strippable liner for vacuum coating tanks. In the vacuum metallizing process the interior of the coating tank becomes covered with successive layers of evaporated metal. This material is difficult to remove and outgasses badly when the tank is evacuated, thus increasing the pump-down time. By coating the interior of the coater with Narliner strippable liner, these metal accumulations can be removed periodically by merely stripping the plastic coating away from the coating tank and short metallizing cycles are thus maintained.

Narliner is a synthetic liquid resin which is applied to the inside of the vacuum coating tank by brushing or spraying. Drying rapidly to form a tough plastic lining, it can easily be stripped from the walls of the coater, leaving them clean and ready for another application of strippable film before the next coating cycle. The liner is available in one- and five-gallon containers.

Phosphating Cleaner

Klem Chemicals, Inc., Dept. MF, 14401 Lanson Ave., Dearborn, Mich.

The above firm announces an im-

proved one-stage phosphate cleaner for more economical preparation of all types of metal surfaces for painting.

Minit-Kote, as the cleaner is known, now removes, in as little as 60 seconds at a concentration of only ¼% to 2% by volume, all traces of oil, dirt, rust and tarnish. At the same time it deposits a light, uniform phosphate coating on the surface that assures better paint adhesion.

The new product is especially designed for use in spray type washers at temperatures of 160°-180°F. Its fast, safe action makes obsolete 3 and 5 stage cleaning methods, saving the time and floor space required for the extra operations. No special handling equipment is required and it is non-toxic.

It may also be used instead of an alkali rinse, in spray gun or steam cleaning equipment, at even lower concentration making these operations exceedingly economical. Since it does not precipitate hard water salts, it may be diluted with any type water.

Further details on this one-stage cleaner may be obtained by writing direct to the manufacturer.

Single Cartridge Respirator

Mine Safety Appliances Co., Dept. MF, Braddock, Thomas & Meade Sts., Pittsburgh 8, Pa.

Economy and comfort are said to be outstanding features of a new, inexpensive single-cartridge "Gasfoe" respirator. All seven parts are independently replaceable, so that long service life is assured. The cartridge, which contains treated charcoal fill, is

designed to protect the wearer against nuisance concentrations of organic vapors, and certain acid gases having obnoxious but relatively harmless odors.

The lightweight, compact facepiece, of formable aluminum, is easily shaped by hand to fit the face contour. This feature, together with a soft sponge-rubber facepiece cushion, assures an excellent face seal without uncomfortable pressure.

Because of its compact and streamlined design the new respirator is said to eliminate "blind spots" for the wearer, and prevent the closed-in feeling which workers frequently complain of in making excuses for not wearing respirators. There are no distracting corners and edges, designers point out, which aids worker concentration and provides a greater feeling of comfort.

The replaceable plastic cartridge is factory packed to prevent crushing or channeling of the charcoal fill. An auxiliary overlay screen keeps paint globules out of the cartridge. A package of these auxiliary screens is provided with the respirator, which is packed in a sturdy and attractive metal container.

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Non-Etch Aluminum Cleaner

Van Straaten Chem. Co., Dept. MF, 546 W. Washington, Chicago 6, Ill.

An alkali cleaning compound that will not etch or discolor aluminum, yet is so powerful that it will thoroughly spray wash the most difficult type of heavy cleaning, was announced recently by the above company.

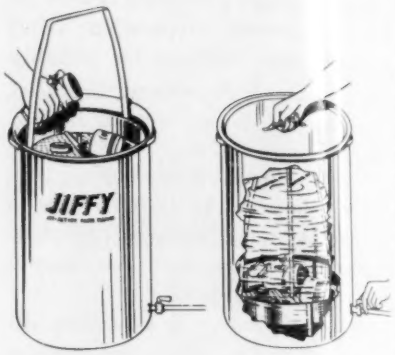
The new compound is non-toxic, is non-inflammable, cleans thoroughly and quickly, and is unique among alkali cleaners because it even prevents rusting of the manufactured ferrous parts after they are washed. It has been safely used on all aluminum and zinc alloys without etching or discoloration and also will not tarnish or discolor other non-ferrous metals such as brass, copper, and bronze.

The new product, known by the formula number Vantrol 5541, is an in-process spray washer type cleaner that has been successfully field tested on both ferrous and non-ferrous metals. It now permits manufacturers to clean difficult parts made of different metals in the same cleaning line.

Air-Operated Solvent Cleaning Unit

Jiffy Parts Cleaner, Dept. MF, 8415 Fountain Ave., Los Angeles 46, Calif.

A new air-operated "jet action" parts cleaner greatly reduces the time required for cleaning small parts of all kinds. Compressed air at any available pressure above 45 pounds creates



a turbulence which produces an effective mechanical cleansing action to the detergent properties of any commonly used solvent. As a result, grease-coated parts are thoroughly cleaned within five minutes, with greater penetration of crevices, grooves, and threaded holes.

The heart of the new parts cleaner is a five-jet agitator unit with 12 ports which admit compressed air in such a way as to set up a turbulence pattern which activitates the entire volume of solvent in the tank. This unit is housed in a heavy steel tank of six and one-half gallon capacity. A heavy-duty parts basket is equipped with a locking hook which grips the lip of the tank, allowing both for easy loading and effortless draining of cleaned parts. After the basket is loaded, the locking hook is released and the basket is lowered into position over the agitator unit. A sturdy friction-grip splash lid seals the tank and prevents spilling of the solvent. An air-valve outside the tank admits compressed air to start the cleaning action, and a turn of the same valve cuts off the air-flow when cleaning is completed. Because of this convenient arrangement, the Jiffy can be used for over-night soaking without air agitation, or for fast cleaning with air agitation, as desired.

The unit is low in cost, is heavily built throughout for long service, and requires a minimum of maintenance. Agitation of the solvent helps to keep the interior of the tank itself clean and free of caked sediment.

Solvent for Cleaning and Degreasing

Brulin & Co., Inc., Dept. MF, 2939 Columbia Ave., Indianapolis 7, Ind.

The new solvent combines several important features which make it excellent for production line use. Prac-

tically non-toxic and non-inflammable, it is safe to use without requiring special safety clothing or special ventilating equipment. Health hazards are eliminated while the efficiency of prime solvents is retained.

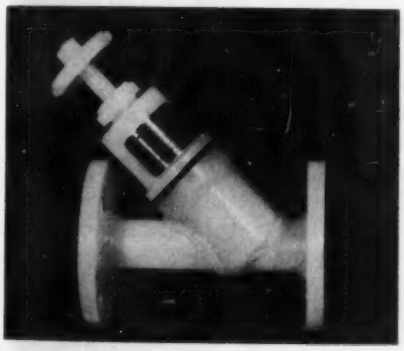
Because Brulin solvent acts and dries quickly, it is excellent for production line use where speed is essential. It is particularly efficient for cleaning electrical motors as it has no adverse effects upon electrical insulation. It does not contain carbon tetrachloride or other toxic chlorinated solvents. It is a highly concentrated solvent for all degreasing and cleaning operations.

Economical to use, low in cost, the solvent is available in drums from 5 to 55 gallons.

Corrosion Resistant Plastic Valves

Vanton Pump Corp., Dept. MF, Empire State Bldg., New York 1, N. Y.

The above manufacturer announces the availability of a new line of corrosion-resistant plastic globe and "L" valves. Constructed entirely of polyethylene, except for the sealing diaphragm on the disc which is composed of a polyethylene-polyisobutylene mixture to insure maximum resilience and drop tightness, these valves will withstand the corrosive action of most acids, including sulphuric, hydrochloric, nitric and hydrofluoric, as well as a variety of caustic solutions.



Relatively light in weight, but high in strength, Vanilene (polyethylene) valves are recommended for working pressures up to 50 p.s.i. and temperatures to 150°F. At this time, ½", 1", 1½" and 2" sizes are available, with larger sizes soon to be announced.

Thickness Tester for Anodized Aluminum

General Electric Co., Dept. MF, Schenectady, N. Y.

This tester operates on the principle of voltage breakdown and, at output voltage of more than 100, the current is limited to 5 millianperes to avoid shock hazards. The unit weighs less than 9 lbs. and requires little technical knowledge or skill to operate.

The unit is designed to meet ASTM specification B110, operates from 115 volt, 60 cycle current and consumes about 25 watts.

Low Toxicity Safety Solvent

Tect, Inc., Dept. MF, Cortlandt & Erie Sts., Dumont, N. J.

A new, low-toxicity safety solvent replacing carbon tetrachloride was announced. Designated as Tecsolv No. 383, the solvent is non-inflammable, fast evaporating and exceedingly low in toxicity.

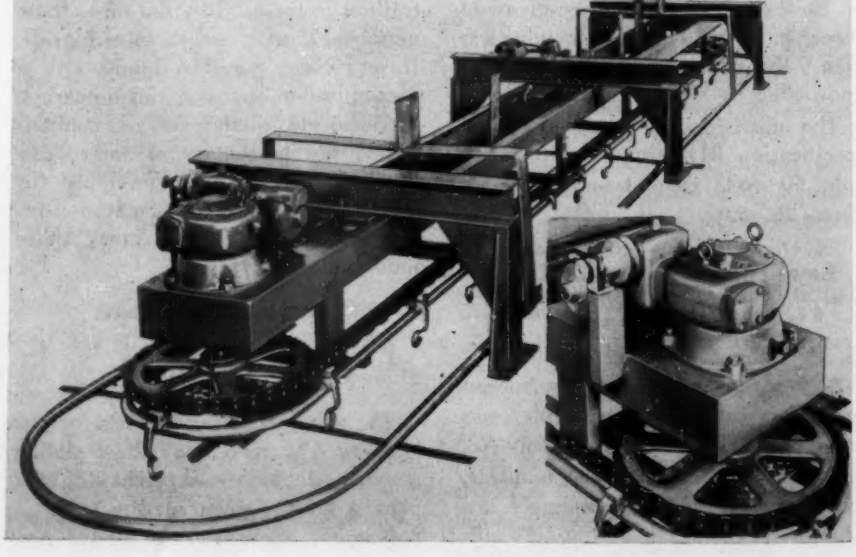
It may be used with vapor concentrations in the air 10 to 20 times those permissable with carbon tetrachloride. It is a clear, colorless liquid with a pleasant odor—but contains no carbon tetrachloride whatsoever. It contains a very low percentage of non-volatile material and was first developed for the cleaning of electronic parts. However, it is now finding many other industrial uses.

Plating Equipment

Wagner Bros., Inc., Dept. MF, 427 Midland, Detroit 3, Mich.

The company has designed a new "packaged" semi-automatic plating system to replace or augment still tank plating for the electroplating field.

Number one advantage of the new



semi-automatic is its versatility. When a run is completed (or between runs of a certain part), the system may be altered for a different job by simply shifting the "pusher shoes" to the desired spacing. Spacing to any dimension in 2" increments may be accomplished in a minimum of time by removing pusher shoes. The second advantage of the semi-automatic is in the reduction of maintenance costs; all wear points are Zerk lubricated, the standard roller chain is available everywhere, and the Micarta pusher shoes last indefinitely. The variable speed control and drive are combined in one unit which may be replaced in minutes by removing a few hold-down bolts. Standard v-belts are used for drive and agitating mechanisms. The plating shop hazards of drip, moisture and corrosion are eliminated by the totally enclosed ball-bearing motor. For long life, the driving sprocket shaft turns on three bearings, two in the speed reducer, one outboard in the frame.

Efficient agitation is obtained by longitudinal motion; the mechanism is mounted at one end on a single bracket with v-belt drive. An unusual feature of the machine is the clean design which permits loading at any point, even at the ends of the tank. The anode bar is formed equidistant from the cathode at ends as well as sides so that plating is uninterrupted and quality is uniform. The packaged semi-automatic includes tank to standard or user's specifications, is completely insulated at critical points and wired ready for installation. Sales of the new equipment are handled by company representatives in principal industrial areas. Descriptive literature is in preparation and may be had by writing to the above company.

Blower-Exhauster for Ventilation

The Brundage Co., Dept. MF, 574 North Park St., Kalamazoo, 11, Mich.

A new compact blower-exhauster that solves ventilating, smoke, heat and fume removal problems for industrial plants, is now available from the above company.

This new exhauster does not require a cabinet or complicated super-structure. It can be fastened directly to a wall, up out of the way. The angle of discharge can be adjusted to any degree. Motor, bearings and all other parts are designed for long-lived efficiency and quiet operation.

Transfer Pump

Paul C. Roche Co., Inc., Dept. MF, 11 Park Place, New York 7, N. Y.

The transference of liquids such as solvents, alkalies and acids is a simple matter with the new Frinet acid pump. It is particularly suited for transfer of corrosive materials from carboys to smaller containers for all parts are of acid-resisting plastic, usable for temperatures up to 40°C.

The patented unit comprises four elements, a standpipe, a rubber stopper, a foot pump and a safety valve. The standpipe is adjusted to the depth of the container by moving it up or down inside the rubber stopper. (Tapered stopper fits wide range of container mouth openings). Air pressure to force out liquid is provided by the foot pump. Pulling handle of the safety valve immediately stops flow, and avoids splashing as vacuum action will draw back instantly all liquid in the standpipe. There are no moving parts to wear out or jam.

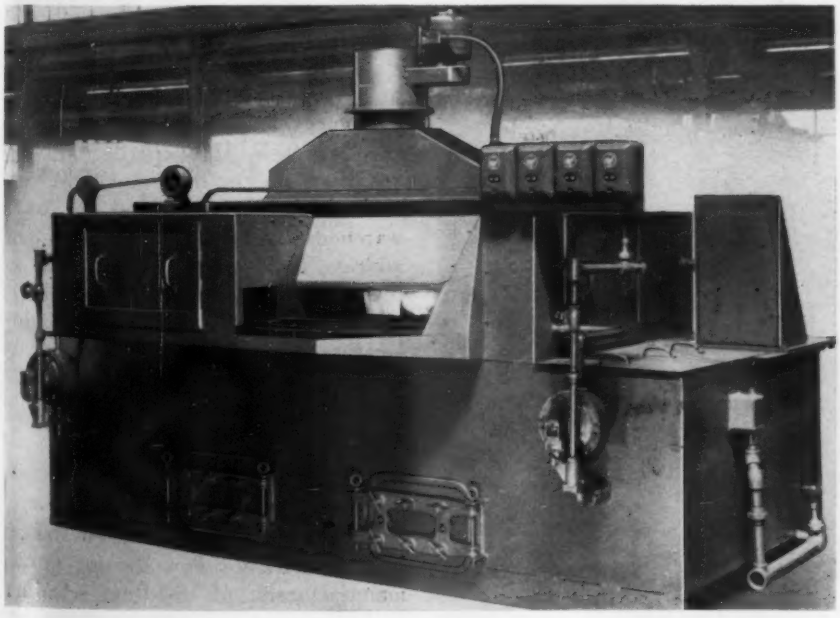
Turntable Design Washing Machine

G. S. Blakeslee & Co., Dept. MF, 1844 S. 52nd Ave., Cicero 50, Ill.

This newly designed washing machine incorporates several interesting features resulting in economy of space and economy in operation. Machine work either in baskets or in special fixtures rides a turntable. The turntable brings clean parts back to the man who put the work in the machine. High efficiency in operation is due to the turntable taking the work through a spray for washing and rinsing. It also takes the work through the air blow-off section, and then back to the loading-unloading station.

This unit is available in a wide variety of sizes, and the turntable is designed to accommodate all types of work, in various stages of manufacture. Special motor-driven pumps circulate the washing and rinsing solutions. The air, connected to the regular shop line, is controlled by an automatic trip mechanism so that air is "on" only as the work passes through the blow-off section. Correct operating temperature is maintained at all times by a bellows operated thermostatic control valve in the heating line.

The equipment can be furnished for steam use or gas heat, and in special explosion-proof construction for use with petroleum solvents.



BUSINESS ITEMS

Chandeysson Elects Officers

A. W. Chandeysson, president of the *Chandeysson Electric Company*, St. Louis, Mo., announces the election of *J. F. Carland* as executive vice president and general manager of the company. Mr. Carland, formerly of Chicago, a graduate electrical engineer, spent twenty-three years with the *General Electric Co.* in the manufacturing, engineering, financial and marketing departments of two operating divisions.

Other officers elected recently were *T. A. Leonhardt*, vice president and plant superintendent and *William E. Schwarz*, vice president and engineering and plant manager. Mr. Leonhardt has been associated with the company for 30 years in several management capacities and Mr. Schwarz, formerly chief engineer, rejoined the company and brings valued experience from his work with *Westinghouse Elec. Co.* and *duPont. D. Bundschuh*, treasurer and office manager and *K. H. Eggers*, secretary were re-elected officers.

James F. Carland

Dolores Bundschuh

New England Buff Moves

The *New England Buff Co.*, located in Boston for over 63 years, has moved its main office and plant to Suncook, New Hampshire, telephone Suncook 422.

The change was made due to expanding business, that the more efficient facilities might help step up production to meet delivery requirements. The firm specializes in the manufacture of cotton buffs.

O'Donohue Purchases Building

The *O'Donohue Sales Co.*, distributor of industrial finishing supplies and equipment, has purchased the building at 3812-18 N. Hubbard St., Milwaukee 12, Wis. For the present the general offices, laboratory and the No. 1 warehouse will be located at this new address, but plans are being made so that eventually all the Milwaukee requirements will be handled from this location.

Dowling Named New Jersey Representative for Bart-Messing Corp.

Carl T. Dowling of South Amboy, N. J., has been named New Jersey representative for *Bart-Messing Corp.*, manufacturers of Sel-Rex selenium

Carl T. Dowling

rectifiers, and *Sel-Rex Precious Metals, Inc.*, both of Belleville, N. J. In his new position, Mr. Dowling will handle sales of selenium rectifiers, plating and polishing equipment and supplies, and precious metal plating salts and solutions.

Prior to joining the above companies Mr. Dowling was associated with *Hanson - Van Winkle - Munning*. He has been engaged in sales and engineering work in the electroplating field for the past eight years.

Whittaker Now Grinds and Processes Italian Pumice

Having recently sold its pumice operations at Grants, N. M., operated by its subsidiary, *Pumice Corporation of America, Whittaker, Clark & Daniels, Inc.*, 260 West Broadway, New York 13, N. Y., now imports specially selected crude pumice from Italy for grinding and processing at its new plant in South Kearny, N. J. Whittaker's resident agent at Lipari, Italy inspects and ships only the purest pumice that is free of all obsidian and foreign matter.

A large inventory of the crude ore is maintained at South Kearny, to insure uninterrupted production and shipment.

Inet, Inc., Appoints Atwater

Inet, Inc., Los Angeles, Calif., worlds largest manufacturers of regulated selenium rectifiers has appointed *Bruce H. Atwater*, sales manager.

Atwater was formerly vice-president sales, Pacific Airmotive Corp., Burbank, Calif.

H-VW-M Makes two New Connecticut Appointments

Hanson - Van Winkle - Munning Co., Matawan, N. J., manufacturers of electroplating equipment and supplies, announces the appointment of *Robert E. Creamer* as district sales manager and *William E. Bridgett* as district sales representative for Connecticut.

Robert E. Creamer

Creamer, whose headquarters will be at Stratford, moves up from his position as H-VW-M sales representative for Connecticut. He was former supervisor of plating at U. S. Naval Air Station, Quonset Point, R. I., from 1942 to 1945.

Before World War II, Creamer worked for the company for one year at its laboratories in Matawan. He left to go with Andrew B. Hendryx Co., New Haven, Conn. He spent six

Howard S. Griffin

in charge of Nickeloid pre-plated metal sales for the provinces of Ontario and Quebec.

Well known in Canadian and foreign trade circles, the new representative has been actively engaged in export and import work for many years. He is a graduate of Queens University in chemical and metallurgical engineering and is also associated with G. R. Marshall & Co., Ltd. of Toronto in the operation of their import department.

Light Metal Processors, Inc., Licensed to do Mollerizing

The first license granted within the United States for use of the Swedish "Mollerizing" process for the coating of steel with aluminum has been awarded to *Light Metal Processors, Inc.*, Redwood City, Calif., *Donald M. Nelson*, chairman of the board of *American Mollerizing Corp.*, announced recently.

Light Metal Processors, a new company, will begin construction of a $500,000 plant at Redwood City immediately, Mr. Nelson said. The process, designed to prevent rust and other forms of corrosion, is particularly applicable to marine products, automotive products, pole line hardware, structural steel and transmission towers, among other products.

Knapp Mills, Inc., Announces Election of Harold E. Olson

Knapp Mills, Inc. has announced the election of *Harold E. Olson* to a newly created post of executive vice-president of its wholly owned subsidiary, *The Andrews-Knapp Construction Co., Inc.*

William E. Bridgett

years with Hendryx, where he was supervisor of plating.

Bridgett leaves H. L. Judd Co., Wallingford, Conn., where he was superintendent of finishing. He spent 18 years with the Judd Co. Bridgett attended New Haven Junior College, and served 4½ years with the U.S.A. Air Force during World War II.

American Nickeloid Appoints Griffin

Howard S. Griffin of Toronto has been appointed Canadian sales representative for *American Nickeloid Co.*, Peru, Ill., according to recent announcement by *Carl C. Struever*, general manager. Operating out of the company's Canadian office at 82 Richmond St., Toronto, Mr. Griffin will be

Harold E. Olson

In making the announcement the company stated that its successful European negotiations on patents and processes which it is developing on behalf of the American Viscose Corp. involving the production of lead clad metals occasions this move.

Mr. Olson is well known throughout the chemical and atomic industries. As New York manager for a prominent lead fabricating concern he was responsible for negotiations and completion of some of the major lead construction programs in America.

Amsco Solvents Announces Opening of New Louisville Branch

Louisville, Kentucky became the newest city to have a member of the Solvents and Chemicals Group when *Amsco Solvents and Chemicals Co.* of Cincinnati opened its Louisville Branch office on June 1.

The new office at 660 S. Fifth St. is headed by *A. M. Schulten*. Mr. Schulten, a native Louisvillean and a graduate of the University of Louisville, stated that local warehouse stocks of solvents and chemicals used in the manufacture of paint, chemicals, inks, pharmaceuticals, industrial finishes and in the cleaning of metal would be available.

The opening of the Louisville office marks the fourteenth major industrial area to be served by the Solvents and Chemicals Group through its 11 member companies. Amsco Solvents & Chemicals acts as distributors for leading manufacturers of such products as alcohols, acetates, ketones, naphthas, aromatic solvents, plasticizers, waxes, naval stores, etc.

Manufacturers in the Louisville area are invited to write or call the new Louisville office for complete details of its operation. The telephone number of the new office is listed as Wabash 3393.

Hults Elected President of Schnefel Bros.

At a recent board of directors meeting at Schnefel Bros. Corp., makers of LaCross manicure instruments, *Willard L. Hults* was elected president. He will fill the office vacated by the death of P. M. Schnefel, who died in May the eve of the 50th anniversary of the company, founded by him in 1903.

Hults joined Schnefel thirty-one

Willard L. Hults

years ago as a production engineer at the age of 24 having previously been manager of the Commonwealth Chemical Co. of New York. In 1938 he was named vice-president in charge of factory operations and executive vice-president in 1951.

Mr. Hults, a native of New Jersey, is a graduate of Rutgers University. He has been a member of the *American Society for Metals* for the past thirty years and served as chairman of the New Jersey Chapter in 1946. He is now a member of the advisory committee. He is also a member of the *American Electroplaters' Society*, The Sales Executive Club of Northern, New Jersey, The Y.M.C.A. of the Oranges and president of the Investors Savings and Loan Association of Millburn, Union and East Orange, New Jersey.

Frederic B. Stevens, Inc. Appointments

Harold W. Faint has been appointed Chicago district sales manager for the *Metal Finishing Division, Frederic B. Stevens, Inc.*, according to *Frank Watt*, sales manager of the division.

Immediately prior to joining Stevens, Faint was sales manager, *Industrial Filter & Pump Mfg. Co.*, Chicago, where he was employed seven years. He has 20 additional years experience in allied industries, all related to the field of metal finishing. Faint served in both World War I and II with the

Harold W. Faint

Robert R. Seaman

U. S. Army and is at present a Lt. Colonel in the U.S.A. Reserve.

He is a member of several professional and fraternal organizations and is, at present, serving on the board of managers, Chicago Branch, *American Electroplaters' Society*.

The company also announced that three service engineers have been added to the fast growing staff of the new customer service department. They are *Robert R. Seaman*, *Donald E. Lind*, and *Howard Michaels*.

Seaman is a graduate of University of Michigan and also holds a degree in Electrical Engineering from the University of Detroit. He will specialize in electrical service consulting for automatic electroplating installations.

During World War II, he served in Northern France, Belgium, and Germany with the U. S. Army Corps of Engineers. Prior to joining Stevens, Seaman was employed by *Hanson-Van Winkle-Munning* in their Detroit district office. He is a member of American Institute of Electrical Engineers and Engineering Society of Detroit.

Lind will specialize on automatic equipment and will spend a considerable amount of time on installation work and periodic good-will service calls.

He joins Stevens with considerable experience as a customer service and installation engineer, having been employed in that capacity for eight years with the Cross Machine Co., Detroit, and Standard Cap & Seal Corp., Chicago. Prior to that he was employed in the production engineering department of Bastian-Blessing Co., Chicago.

Lind received his education at Northwestern University, Evanston, Ill., and also completed the tool and die apprenticeship requirements at Lake Shore Engineering Works, Marquette, Mich.

Michaels has been with the Stevens organization for some time, on service work. As part of the customer service department he will perform final installation and periodic maintenance

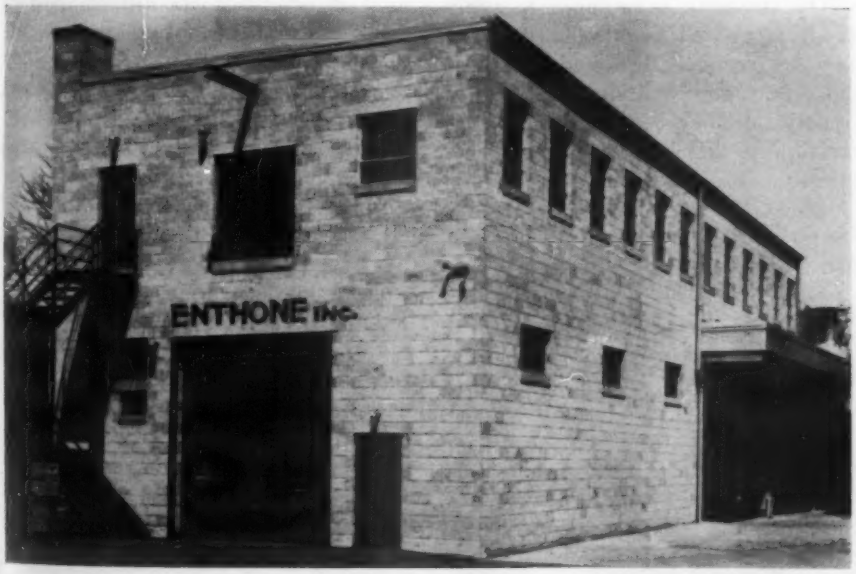
Donald E. Lind

Howard Michaels

inspections and will be available for engineering consultation work on the best methods of revamping existing machines to do additional types of work. He was employed in the general maintenance department at Packard Motor Car Co., Detroit, before coming with Stevens. He is a member of the Detroit Chapter *American Electroplaters' Society* and the *Engineering Society* of Detroit.

Enthone Increases Facilities

Enthone, Inc., New Haven. Conn., manufacturers and suppliers of chemicals for the metal finishing industry, announces the completion of increased manufacturing and warehousing facilities at their plant. The photograph shows the recent two-story addition to their group of buildings. The added area amounts to 6.600 square feet. At the present time, the ground floor of this new building is being used for warehousing of company products and distributed chemicals and for the enlarged shipping and receiving department. Increased warehousing facilities will allow the stocking of larger quantities. Space formerly used for warehousing has been made available for the increased manufacturing requirements of the company.



The entire second floor of this new structure is to be used for the new research and development and the customer service laboratories which will be ready for occupancy in 1954. These new laboratories will have the latest improvements for such facilities.

New Vacuum Rhodium Coating Service

The *Serfass Corp.*, 524 West Broad St., Bethlehem, Pa., has announced that it is equipped to apply coatings of rhodium to non-conductive and conductive materials by using the vacuum technique. Rhodium is being applied on a commercial basis upon glass and other non-conductive substances to

meet specifications of transmittancy and hardness.

The company is equipped to apply rhodium as well as other metals that can be vacuum deposited, such as aluminum, gold and sliver. The work is performed on a job basis. Some of the objects that have been coated are glass, microscope slides for analysis of blood, mirrors for optical apparatus, reflectors for telescopes, glass go and no-go gauges, and glass bearing surfaces.

Rhodium coatings when deposited upon glass and are subjected to baking become extremely hard, and the coating, therefore, is ideal for making thin hard surfaces to resist wear or friction. In addition to the vacuum coating facilities, Serfass Corporation is equipped to measure reflectivity, porosity and transmittance of coatings.

The coating service is available to technical laboratories, industrial organizations and the general public. General office of the company is located at 442 Elm St., New Haven, Conn. Laboratory and production facilities are located at the above address.

Allied Research Appoints Two New Representatives

Allied Research Products, Inc., Baltimore manufacturers of Iridite finishes and ARP plating chemicals, has announced the appointment of two new field representatives for their *Allied Research Sales Corp. W. O. Osborne* has been assigned to Cleveland to handle the northeastern Ohio-Western Pennsylvania territory, replacing the *Baker Distributing Co.* Mr. Osborne's headquarters are at Suite 403, 1501 Euclid Avenue, Cleveland 15.

Earl H. Messmore has been assigned to Indianapolis and will handle the northern Indiana and northwest Ohio territory. Mr. Messmore's headquarters are at 200 Standard Building, Fort Wayne, Indiana.

Both men will handle all company finishes for corrosion protection and paint systems on non-ferrous metals, as well as their line of zinc and cadmium plating brighteners and other plating chemicals.

Diamond Alkali Now Operating New Facilities

More extensive, centralized storage-and-handling facilities to serve *Diamond Alkali Co.* customers in New Jersey, New York and surrounding areas have been completed and are now in operation at the company's Jersey City silicate plant, it was announced today.

In line with the company's continuing policy of increasing customer service, the new construction provides 24,000 additional square feet of storage space for packaged chemicals. It consists of a steel frame-Transite siding structure 200 feet long by 120 feet wide. A masonry wing, 21 feet by 52 feet, attached to the east end, houses the employees' locker room, lunch room, service quarters and office.

For this expansion at the company's Tonnele Ave. property, land reclaiming measures were necessary. Fill was added, and treated wood pilings were driven to support the concrete flooring. A double bowstring truss type

roof tops the completed building.

W. H. Evans, general manager of silicate operations at the company's Cleveland headquarters, described the expansion as part of a company-wide program to insure faster and better service to all consumers of Diamond Alkali chemicals. He added that a similar project recently was completed at the company's Cincinnati silicate plant.

International Nickel to Expand Mines

The *International Nickel Co. of Canada Ltd.*, will begin work immediately on large-scale expansion of two of its mines in the famous Sudbury District of Canada as result of a purchase agreement with the Defense Materials Procurement Agency, it was announced recently by *Edmund F. Mansure*, administrator of DMPA.

Mr. Mansure said that the new contract, which will add 120,000,000 pounds of metallic nickel to U. S. supplies in a relatively short period, brings DMPA's emergency program for nickel "close to completion."

Deliveries will start in about seven months and proceed at an average rate of 2,000,000 pounds a month for five years. The nickel will be purchased at the present market price, f.o.b., Fort Colborne, Ontario, plus an allowance for amortization and additional costs of production.

As a result of the purchase contract, INCO, with its own funds, will open up large deposits of low-grade nickel and copper ore which had not previously been included in the Company's development plans. The big underground operation will involve the mining and processing of about 10,000,000 tons of ore from the Stobie Section of the Frood-Stobie Mine and the Murray Mine.

In addition to the 120,000,000 pounds of nickel, the contract provides for the sale of 100,000,000 pounds of copper. The price for copper will be 27 cents (Canadian), f.o.b., Copper Cliff, Ontario.

With the contract announced today, DMPA has purchase agreements with private producers covering a total of 520,000,000 pounds of nickel. The entire program covers a period of 10 years. From the standpoint of the quantities firmly committed and the rate of delivery, the INCO contract is by far the largest of those signed.

Enthone Holds Sales Meeting

A photograph taken at the annual spring sales meeting of *Enthone, Inc.*, New Haven, Conn., shows the organization's representatives from Cleve-

land, Chicago, and Los Angeles as well as those from the Eastern Seaboard and New England states. The meeting, which was held over the two-day period of May 21 and 22 at Lakeville, Connecticut, was also attended by two representatives of *R. O. Hull & Co.*, Cleveland, Ohio.

Hooker Electrochemical Promotes Walmsley

John T. Walmsley has been promoted to the Chicago and Midwest area as a salesman for *Hooker Electrochemical Co.* His headquarters will be at One North LaSalle St., Chicago, Ill.

Mr. Walmsley has been with the company since 1950, first as a chemical engineer in the process study group at the Niagara Falls plant and later as assistant sales engineer at Tacoma, Wash. Since June 1952 he has been in the Niagara Falls sales office.

Canadian Permag in New Location

Canadian Permag Products, Ltd., presently celebrating its twentieth anniversary, has opened a new plant in St. Lambert, Quebec, Canada, a suburb of Montreal. Three times the present land requirements have been purchased, to allow for anticipated growth.

Edward Magnuson, left, Chairman of the Board, receives key for new plant from President Allen A. Rylander.

The new building houses the general offices and all manufacturing facilities, with ample accommodations for carrying large stocks of finished compounds. They manufacture industrial cleaning compounds and solvents.

Kold-Hold Changes Name

The Kold-Hold Mfg. Co., Lansing, Mich., manufacturer of refrigeration equipment and products in the industrial and domestic heating fields, has announced a change in its corporate name to *Tranter Mfg., Inc.*, effective at once. *James R. Tranter*, Kold-Hold president and general manager who will continue in the same capacities in the company that now bears his name, pointed out that the name change will have no effect on ownership of the company or its corporate structure.

Kold-Hold was founded in 1931 by the late *Ransom E. Olds*, founder of the Oldsmobile and Reo motor car companies. Controlling stock in the company was purchased by Mr. Tranter in 1937.

A Platecoil Division has been established to manufacture and merchandise Platecoil process heating and cooling plates, which were developed by the company about five years ago as replacements for pipe coils in a wide variety of industries.

News from California

By Fred A. Herr

D. N. Eldred, plating chemist, has moved the *Eldred Laboratories* from 791 East 15th St. to 2314 East Eighth St., Los Angeles, where offices and laboratory facilities have been established in the building occupied by *Shepard & Kent, Inc.*, distributors of plating and polishing supplies. Since leaving the West Coast *du Pont* organization some years ago, Eldred has served the Southern California plating industry on matters pertaining to solution control. *Don Baudraud* is his partner.

Alert Supply Co., Los Angeles, announces it has been appointed West Coast representative for the *Chandeysson Electric Co.* of St. Louis, Mo., manufacturers of generators for the electroplating industry.

Arrangements for the representation were made during conferences in Los Angeles in May between *James Garland*, vice-president of Chandeysson, and *Alfred E. Perkins* and *A. D. Gaskin*, owners of Alert Supply. Alert also handles a complete line of plating and buffing compounds and chemicals and various lines of shop equipment and machinery.

John Graham, formerly of Indianapolis, Ind., is now owner of the *Ambro Plating Co.*, 7990 Santa Monica Blvd., Los Angeles. He acquired the plant from *George Ambro* and is now operating it under the name of *Graham Plating Co.* Graham specializes in silver plating antiques, and nickel and silver plating medical instruments. Prior to coming to Southern California he served as foreman for R&S Platers in Indianapolis, a hard chrome job shop. Ambro is now employed in the plating department of *Joseph Fraser's West Los Angeles Plating Co.*

The *A. F. Holden Co.* of Detroit, Mich., and New Haven, Conn., in May opened its new western plant at 3311 East Slauson Ave., Los Angeles. The new factory is a complete operating and manufacturing unit, equipped to produce 50 different salt bath compositions and 15 types of industrial pot furnaces, gas or electrically fired. The plant is also set up for production of welding and brazing fluxes, black oxide finishes and cleaning compounds. *Charles A. Zavorskas* has been named plant manager.

Louis Reed, sales engineer for *Superchrome Engineering Co.* of Los Angeles returned early in June from an eastern business trip during which he visited New York, Newark and various other points. He held conferences with *Dr. C. B. F. Young* and A.E.S. President *Franklin J. MacStoker*, conveying the latter's good wishes to the Los Angeles A.E.S. membership at the June 10th meeting.

Minneapolis-Honeywell Regulator Co. has construction under way on a new factory in Gardenia, Cal., which reportedly will cost $2,000,000 and employ some 2,000 persons. The new plant will house the appliance division and provide expanded facilities for production of automatic controls

for water and wall heaters, floor furnaces and central heating plants.

Horace Smith, formerly chief chemist for *Schlage Lock Co.*, San Francisco, has been appointed technical service engineer in the laboratory which *L. H. Butcher Co.* operates in its Bay Area Branch for emergency solution testing and other testing services. Mr. Smith is quite active in the affairs of the *American Electroplaters' Society* and has served as secretary of the San Francisco Branch for several years.

The *Barber-Webb Co.* of Los Angeles announces the introduction to the trade of Rigid Koroseal, a high impact strength product, which *Allyn Webb*, vice-president, described to METAL FINISHING as a corrosion resistant Polyvinyl chloride for use in plating. Applications which Mr. Webb cited for the product include its use for tanks and tank linings, fume exhaust systems, fans, fume heads, chemical piping, etc.

The product is reported by its manufacturers to have exceptional strength. Mr. Webb demonstrated for this writer that a laboratory pan of $\frac{1}{16}$" thickness will support a 200 pound man. The company currently also makes polyester and glass drums and similar items under the trade name of Acidrum.

Jack Raskin, general manager of the *L. H. Butcher Co's.* west coast plating supply divisions, reports the firm has started manufacturing a complete line of electrical equipment, including rectifiers, rheostats, line switches, reversing switches, and barrel equipment.

Leonard Brooks has been appointed factory manager of *Cannon Electric Co.* of Los Angeles. The promotion climaxes Brooks' 15 years tenure with the company during which he rose from a machine operator in 1937.

J. M. Bowman, president of *Bowman Chemicals, Inc.*, Los Angeles, announces that the firm has installed equipment to produce liquid honed finishes, a method of surface finishing that uses abrasive powders, of various degrees of fineness, in a chemical solution and forced at high velocity through special nozzles against surfaces to be treated.

Another project the firm is working on, Mr. Bowman reported, is identification coloring of metals, whereby the identification of small items, such as washers, screws, etc., can be made visually with respect to size and type.

E. T. Brown of Los Angeles, president of the *Metal Finishing Association of Southern California*, left for Washington, D. C., on June 12th to attend a meeting of the Industry Advisory Board on matters pertaining to the nickel situation.

Harvey Hoisch has been appointed chemist on the *L. H. Butcher Co.'s* Los Angeles area technical staff. Hoisch, a graduate of the University of California at Los Angeles, was formerly affiliated with the *Dartell Laboratory* in Los Angeles.

The Southern California Branch of the *American Society for Testing Materials* sponsored a dinner and technical session at the Rodger Young Auditorium, Los Angeles, on the night of June 5, to present a technical discussion on "Paint and Paint Materials" by *James W. Bowen*, sales manager of

the *National Lead Co.'s* Los Angeles division. The speaker discussed "Kaleidoscope of Paints," using a 20-foot panel paint museum as an accessory visual aid. The discussion, which was supported with displays, covered past and present trends in the paint industry, giving a number of examples of paint pigments and vehicles.

(*Concluded on page* 114)

Manufacturers' Literature

Plating Waste Treatment

The Permutit Co., Dept. MF, 330 West 42nd St., New York 36, N. Y.

The treatment of electroplating rinse waters in industrial plants through the use of ion exchangers has been one of the most attractive methods considered in recent years for the elimination of complex water pollution problems. One of the most successful applications of this process has been toward the recovery of chromic acid from electroplating solutions. Now, the process has been extended to the treatment of mixed chromate rinse waters, the recovery of cyanide from cyanide plating rinse baths etc.

Valuable information on these applications is contained in Bulletin No. 3865, an 8-page preprint of a paper "Plating Waste Treatment" given by C. F. Paulson, Special Applications Engineer of the company.

Table, charts, cost and space comparison requirements and other data supplement the material which describes some of the forms in which industrially important metals can be economically recovered.

Rectifier Plating Power Supplies

General Electric Co., Dept. MF, Schenectady 5, N. Y.

A new two-color booklet describing their complete line of manually-controlled and automatically-regulated metallic rectifier power supplies for electroplating and similar processes, has been announced as available from the company.

The fully-illustrated, 16-page publication, GEC-970 describes the advantages, applications, and operation of the units and lists ratings, dimensions, and specifications.

Buffing Compound Bulletin

Apothecaries Hall, Dept. MF, Waterbury 88, Conn.

As an addition to their series of six bulletins issued last year, the above manufacturer has just issued Bulletin B-7 entitled. "*AHCO* Buffing Compounds." The bulletin contains information about their complete line of grease bars, including among other types tripoli and white compounds. Copies available on request.

Descaling Steel Sheets by Abrasive Blast

American Wheelabrator & Equipment Corp., Dept. MF, 1150 South Byrkit St., Mishawaka, Ind.

Descaling hot-rolled steel sheets by airless blasting and eliminating acid disposal problems are the topics discussed in a new bulletin 914. Giving an actual case history with performance data, and illustrated by photographs of the equipment employed, plus a flow diagram of a sheet descaling line, this bulletin shows how important savings were made available to one company by airless blasting, because it was able to conveniently

employ hot-rolled steel in place of cold-rolled.

Immersion Heater Catalog

Cleveland Process Co., Dept. MF, 7016 Euclid Ave., Cleveland 3, O.

A new electric immersion heater catalog that features a section of application data for calculating the power requirements for heating processing tanks has been prepared by the company.

The data simplifies the problem of estimating heat losses, determining the correct KW needed and selecting proper heater size for tank capacity. With these factors accurately determined, it is an easy matter to establish the most efficient and economical immersion heater installations.

Clepco's calculating guide also points out that all cleaning and finishing tanks should be automatically controlled since any change in room temperature, work processed, liquid level, etc., will affect tank temperature unless thermostatically held to required degree.

Fully described in the new catalog are two types of electric immersion heaters manufactured by the company.

A new, heavy duty steel-sheathed unit for heating non-corrosive liquids and mixtures has a nickel alloy resistance element covered by a quartz body. Low heat density protects both heater and liquids from carbonization or "frying." The acid tank heater features a non-corrosive fused quartz body. High heat density is radiated, not conducted.

Phase Contrast Microscopy

Bausch & Lomb Optical Co., Dept. MF, Rochester 2, N. Y.

A 16-page brochure describing the theory, practical applications, and equipment used in phase contrast microscopy has been published by the company.

The technique covered in the Catalog D-104 has many useful applications in chemistry, mineralogy, industrial health (for making dust counts), metallurgy, and other fields.

The brochure is illustrated with a number of diagrams and photographs, including 20 photomicrographs made under magnifications ranging from 210X to 900X. Four of these show graphically the results obtained with phase contrast microscopy as compared with conventional microscopy. Also included is a bibliography on phase contrast microscpy and related subjects.

Vacuum Metallizing

National Research Corp., Dept. MF, Seventy Memorial Drive, Cambridge, Mass.

Vacuum metallurgy is an established low-cost, practical process for industrial finishing. The thin brilliant coatings, usually aluminum, may be color tinted by transparent over-coats.

The above company offers reprints of a recent article, "Economical Finishing with Vacuum Metallurgy," describing the use of the vacuum metallizing process in manufacturing both plastic and metal parts. This article discusses all factors which must be considered in determining the applications of this process to specific finishing or coating problems.

Rubber and Brick Tank Linings

Nukem Products Corp., Dept. MF, Buffalo 20, N. Y.

The above firm has issued an eight-page illustrated booklet on their corrosion-proofing service for tanks and equipment. The different membranes used in rubber lining tanks are given, each listed with its characteristics and advantages, as well as a membrane resistivity chart. The booklet also goes into detail regarding acid brick sheathings.

The company will send copies of the bulletin on request, or will supply any additional information desired.

Rubberized Abrasives

Cratex Mfg. Co., Dept. MF, 81 Natoma St., San Francisco 5, Cal.

Presenting the adaptability, versatility and application of Cratex rubberized abrasives, together with complete specifications and prices is the interesting content of the new Catalog No. 53, just issued. The new 8-page catalog contains a most complete and comprehensive treatise about rubberized abrasives on burring, smoothing and polishing operations and their use in industrial establishments.

Safety Solvent Fact Sheet

Octagon Process, Inc., Dept. MF, 15 Bank St., Staten Island 1, N. Y.

A 3-page fact sheet booklet on three tailored types of Klearall safety solvents has just been published. All have been expressly developed for cleaning electrical and mechanical equipment where fire and explosive hazards are present and toxic odors are objectionable. The booklet gives instructions for use and specifications. The three types are:—

Klearall 90 — Fire Underwriter Approved, U. S. Coast Guard Certificate No. 361, a low-cost product for general use.

Klearall 95 — A super-dry type with very fast evaporation.

Klearall 100 — Has long service life. Capable of considerable re-use.

Resurfacing

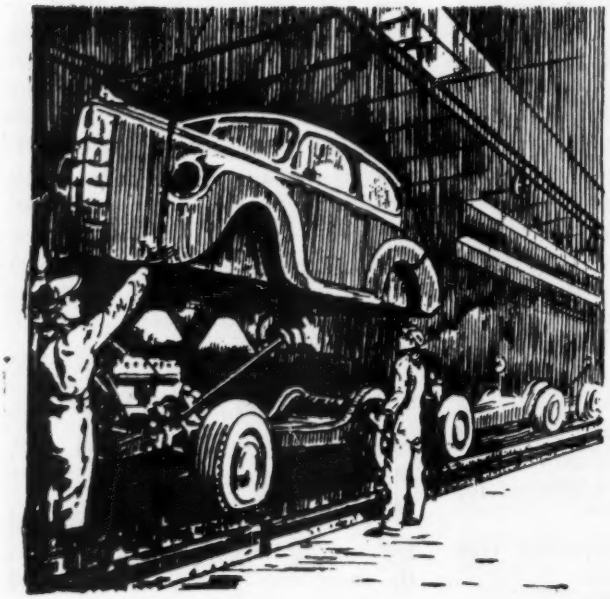
United Laboratories, Inc., Dept. MF, 16801 Euclid Ave., Cleveland 12, O.

Publication of a new two-color brochure describing low-cost mastic floor resurfacing is announced. This new literature explains in detail all necessary proportions for mixing along with ingredients specified for certain jobs. Featured in the bulletin are the low-cost advantages of such materials along with suggested uses. ULI low-cost mastics are used both as a new surfacing over old concrete or wood floors as well as an underlayment for leveling floors prior to the application of tile, linoleum, etc. The material is claimed to withstand heavy loads inside or out.

Bulletin On Metal Cleaners

Apothecaries Hall Co., Dept. MF, Waterbury 88, Conn.

As a new addition to the series of bulletins on their finishing products, the above firm has issued Bulletin B-8 entitled, *Ahcoloid Metal Cleaners*. This bulletin contains information about their complete line of cleaners for soak tanks, electrolytic cleaning, power washers, and tumbling barrels. Copies of the new bulletin are available on request.



MOTOR CITY PLATING NEWS

Detroit Branch

President *L. C. Borchert* called the meeting to order at 8:30 P.M. in the Hotel Statler with approximately 140 members and guests present.

Secretary-treasurer *R. J. Racine* read the names of four applicants for membership. All were unanimously elected into the Branch. He announced that the Waterbury Branch of A.E.S. was offering at the National convention in Philadelphia. *Francis Eddy* (of Chase Brass & Copper Corp.) as a candidate for third vice-president.

Mr. Borchert announced the follow-

ing appointments to Committees:

Ass. Secretary-Treasurer — *E. J. Kubis.*

Publicity Chairman — *R. O. Watson.*

Ass. Publicity Chairman — *Carl Anderson.*

Christmas Party Chairman — *H. J. McAleer.*

'54 Stag Day Chairman — *R. H. Dudley.*

General chairman *A. J. Emmerich* announced that the first notice had been sent out and that all the other necessary preparations were being made for the biggest party yet, which is to be held at the Glen Oaks Country Club.

The committee on *History of the Branch* was dissolved and Mr. Borchert commended *Bert Lewis* for a fine report.

Mr. Borchert announced the death of *Frank Richards* of Chrysler Corp., past member of the Detroit Branch; and the passing away of *Oliver P. Watts* who did much for the science of electroplating.

Educational chairman *Fred Olmstead* opened the evening with a technicolor film on the "Pacific Islands of World War II" filmed by the Chrysler Corp. Mr. Olmstead then introduced the principal speaker, *John Durant*, assistant to the director of research, National Research Corp., Cambridge, Mass.

Mr. Durant began his talk on vacuum metallizing by describing and explaining the basic steps of the operation. With a demonstration unit, Mr. Durant showed how simple the method was by coating some flashlight reflectors and jewelry with a film of aluminum.

The demonstration was accomplished by suspending the prepared pieces in an extremely high vacuum and the aluminum that was to form the coating film was evaporated at high temperature near the center of the vacuum vessel in such a way that the evaporated metal traveled in straight lines to strike all the surface to be coated. The jewelry was rotated so that all sides would be coated. Although the filament was hot enough to boil aluminum, the work stayed at room temperature.

It was explained that, while fully recognizing the process as competitive to electroplating, the installation of it in a metal finishing plant, it is under-

standably placed under the jurisdiction of the plating department.

The talk was concluded with the information that the resistance of vacuum metal films to corrosion and abrasion is only as good as the lacquer overcoating and, therefore, this process has a limited application at the present.

After numerous questions, both general and concerning the application of this method, the meeting was adjourned at 10:15 P.M. Refreshments were served following adjournment.

Frederick B. Stevens Adds Hoff to Sales Staff

The *Metal Finishing Division, Frederic B. Stevens, Inc.*, Detroit, has added *Robert H. Hoff* to their sales staff in Southern Michigan. Hoff, a chemical engineer, was employed as a sales engineer by Grow Solvent Co., Detroit, before joining the Stevens organization.

He attended the Illinois Institute of Technology and graduated from University of Detroit. Hoff also served 3 years as a Quartermaster with the U. S. Navy during World War II.

Robert H. Hoff

He is a member of the Detroit Chapter, *American Chemical Society* and *American Electroplaters' Society*.

McAleer Mfg. Co. Changes Name

F. A. Weihe, Jr., president, announces that the *McAleer Mfg. Co.*, has changed its corporate name to the *Goodison Mfg. Co., Inc.*

The former company manufactured polishes, other protective maintenance and refinishing materials, and industrial buffing and polishing compounds. The new company will manufacture industrial buffing and polishing compounds exclusively. All products will carry the Goodison name.

Weihe, active in the chemical field for the last 30 years, says that the company's management and personnel remain the same, and its own field organization continues to handle all sales. Main office and plant are at 4393 Orion, Rochester (Goodison), Mich.

Brewer Rejoins Automotive Rubber

Recently announced by *R. L. Redmond*, vice-president of *Automotive Rubber Co., Inc.*, Detroit, was the return of *Arthur M. Brewer* to the company's engineering staff.

Brewer first joined the company at the close of World War II. He had served with the 9th Air Force in the European Theater, having flown 35 missions in the famous B-26 "Marauder" light bombers. A graduate engineer, he spent two years as a sales

Arthur M. Brewer

engineer for the company, working extensively in the electroplating field. He specialized in rubber applications to plating equipment; a phase in which his experience and knowledge was widely recognized.

With the opening of the Korean conflict, Brewer, being a member of the 127th Fighter Wing of the Michigan Air National Guard, was again recalled to active duty. He saw 27 months of service at the Lake Field Air Force Base near Phoenix, Arizona. There he functioned as a jet pilot-instructor until his second, and most recent, release.

Having resumed his association with the company on April 10, 1953, Brewer has devoted his time in developing a variety of fields for the firm's protective rubber applications.

H-VW-M Appoints New Sales Representative for Western Michigan

Hanson - Van Winkle - Munning Co., Matawan, N. J., manufacturers of electroplating equipment and supplies, announces the appointment of *R. K. Martin* as sales representative for Western Michigan. His field office will be at Grand Rapids with headquarters in Detroit.

Martin come sto H-VW-M from Merchants Chemical Co., Inc., where he was an industrial sales representative for the past 3½ years. He has worked with Allison Division of General Motors as a test engineer, chemist and plating analyst; with Wright-Patterson Airforce Base as a chemist in

R. K. Martin

the research and development department of the electrochemical section; and with *Wyandotte Chemicals, Inc.*, as an industrial service representative.

Martin attended Wabash College, and took advance training in chemistry at the University of Dayton.

Frieling and Lloyd New Wyandotte District Managers

A. J. Frieling and *M. L. Lloyd*,

A. J. Frieling

M. L. Lloyd

Guy A. Cummings

effective June 1, became managers of *Wyandotte Chemicals'* Boston and Dallas district offices.

Mr. Frieling, a native of Grand Rapids, Mich., has many years of sales and administrative experience in the Detroit area. He served the company in Dayton, Ohio, before his transfer to a special home office assignment.

Mr. Lloyd, a native of Pennsylvania, has several years of merchandising experience in Baltimore, and since 1949 has been a resident company representative in Roanoke, Va.

Mr. Frieling and Mr. Lloyd transfer to Boston and to Dallas after completing a three-month program at the company's home office.

Stevens Promotes Cummings

The appointment of *Guy A. Cummings* to the newly-created position of assistant sales manager, *Frederic B. Stevens, Inc., Metal Finishing Division,* was announced recently by Stevens president, *W. J. Cluff.* Cummings will direct sales activities for all Stevens' automatic plating and processing equipment. Increased demand for automatic electroplating installations and Stevens expanding sales program in the metal finishing equipment field were the reasons given for the creation of this new position.

Cummings has been employed as a sales engineer at Stevens for seven years. Prior to joining the company

he was employed in the sales department of the Sperry Gyroscope Co. He is a graduate of Worcester Polytechnic Institute, Worcester, Mass. At present he is an active member of the Detroit Chapter, American Electroplater's Society and Engineering Society of Detroit.

NEW BOOKS

Industrial Wastes

Edited by Willem Rudolfs. Published by Reinhold Pub. Corp., 330 West 42nd St., New York 36, N. Y. 1953. Price $9.50. 486 pages plus index.

Prepared with the collaboration of 17 experts, this book will be of value to chemists and engineers concerned with the treatment and disposal of industrial wastes, since it covers practically all phases of the subject. The chapter on plating wastes by M. Gilbert Burford and Joseph W. Masselli is a very complete survey of the field with most attention, naturally, given to cyanides. It includes a list of 88 references for those who wish to investigate the subject further. The toxicity to fish and fish food of the different chemicals employed in metal finishing processes is tabulated for the consideration of those plants discarding wastes into streams and rivers. In addition, the chemistry of various treatment processes and practical operational methods are discussed. The specific subject of steel pickling wastes is treated in a separate chapter by Richard D. Hoak. Although only these two chapters, out of the 17 in the book, are concerned with the particular requirements of our industry they are sufficiently detailed to warrant inclusion in the plant library in view of the growing importance of waste disposal.

Book of ASTM Standards

Published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 1952. Part 1. Ferrous Metals, 1602 pages, $12.00. Part 2. Non-Ferrous Metals, 1359 pages, $10.00.

Of the seven volumes of ASTM standards, *Part 1.* and *Part 2.* are the ones of practical interest to the metal finisher, the former containing 291 standards and the latter 268. Each volume is complete with detailed subject index, two tables of contents and a complete index is available for all the volumes as a separate volume.

Part 1. covers different types of steel, electrodeposited coatings, and test methods for corrosion, also weight and uniformity of zinc coatings. Part 2. covers non-ferrous metals and alloys, anodic and electrodeposited coatings, thickness and corrosion test methods. The test methods of most interest to platers include the microscope thickness test, salt spray and immersion tests. Standards for coating quality are detailed for the commonly applied metal finishes.

Analysis of Aluminum Alloys

Edited by G. H. Osborn & W. Stross. Published by Chemical Pub. Co., Inc., 212 Fifth Ave., New York 10, N. Y. 1953. Price $3.50. 142 pages plus index.

This volume surveys the analytical methods for determination of copper, magnesium, silicon, iron, manganese, nickel, zinc, tin, antimony and chromium, in addition to a number of less common elements. Many of the methods are new, some are modified meth-

ods and a few are standard, established procedures. The methods described are stated to have been tested in industrial laboratories and procedural details have been supplemented, where necessary, by theory. The plating chemist wil probably find much helpful information in this small book, which can be adapted to his specific needs.

OBITUARY

STEWART A. MILLAR

Stewart A. Millar, new products development engineer for the *Detrex Corp.* of Detroit, major manufacturer of industrial cleaning equipment and chemicals, passed away recently at the age of 27. Death was attributed to complications following a kidney ailment.

Regarded as one of the most brilliant members of the Detrex engineering staff, young Millar was a key man in the development of ultrasonic metal cleaning equipment, recently announced by the company. He was stricken fatally, shortly after returning from the West Coast where he had demonstrated ultrasonics at the Western Metal Show in Los Angeles and also before a meeting of the *American Electroplaters' Society*.

Born in Newark, N. J., and raised in Nutley, N. J., Millar first joined Detrex as a co-op student in 1945. He alternated his time for several years between the company and the University of Michigan, where he was a student assistant and an employee of the Engineering Research Institute. He joined the company as a full-time employee in January, 1950.

He was a graduate of Redford High School, Detroit, and received his B.S. in chemical engineering from the University of Detroit. He was awarded his master's degree by the University of Michigan.

He was a member of Tau Beta Pi and Phi Lambda Upsilon, engineering honor societies. Millar, who made his home in Detroit, was married only recently.

Associations and Societies

AMERICAN ELECTROPLATERS' SOCIETY

Louisville Branch

The regular monthly meeting of the Louisville Branch, American Electroplaters Society was held Thursday, April 16, 1953 at Korfhages Restaurant 1482 Preston Street, Louisville, with a dinner served at 6:30 P.M. President *Arthur A. Oertel* opened the business and open meeting at 8:00 P.M. with 28 members and guests present.

Stanley J. Beyer, chairman of the nominating committee submitted a list of members for nomination as officers of the Branch for the 1953 fiscal year.

The technical sessions chairman, *Stanley J. Beyer*, reported that *Edward Wild* of the R. O. Hull Co., Rocky River, Ohio, will be the May speaker and the subject will be "Practical Uses of a Hull Cell. Also a General Electric Co. movie entitled "The Life of Thomas A. Edison" will be shown.

A letter was reecived from executive secretary *D. Gardner Foulke* stating that the Louisville Branch is No. 1 in the third group competition of new members.

Arthur A. Oertel, with the assistance of *T. K. Allison* have completed the purchase of the 60 x 60 projector screen. The purchase price was $33.66

The newly elected officers for the Louisville Branch A.E.S. for the 1953 to 1954 fiscal year are as follows:

President — *P. H. Pate.*

First Vice-President — *John W. Scholl.*

Second Vice-President — *William W. Francis.*

Secretary & Treasurer — *Joseph G. Sterling.*

Librarian — *Stanley J. Beyer.*

Sargeant-at-arms .... *John Kehrer.*

Board of Managers — *E. W. Eckerle, Arthur A. Oertel.*

Delegates and alternate delegates elected to the National Convention to be held in Philadelphia, Pennsylvania from June 15 to 19 inclusive are as follows:

Delegates: *Thomas K. Allison, Joseph G. Sterling, Stanley J. Beyer.*

Alternate Delegates: *Arthur A. Oertel, P. H. Pate, Garland A. Logsdon.*

A. A. Oertel turned the meeting over to educational chairman, *Stanley J. Beyer*. After a brief talk, Beyer introduced *Arthur Du Rose* of the Harshaw Chemical Co., Cleveland, Ohio, as the speaker of the evening. Mr. Du Rose spoke on the subject of Lead-Tin Alloy Plating which may be summarized as follows:

1. Lead-tin alloy plating is used exclusively on bolts, nuts and bearings and many other parts.
2. 5 or 6% tin in lead deposit is very good and stands up fine under salt spray tests.
3. Small glue concentrations in the tin lead alloy solutions are very important and desirable.
4. If high current density is used more tin will deposit in proportion to the lead on parts.
5. Strip lead or lead-tin using sodium nitrate and caustic soda. Anodic

strip can be used but the resulting smut must be removed before replating.

6. A good lead bath composition is: Lead, 10 to 25 oz. per gal. Free HBF_4, 4-3 to 8 oz. per gal. Boric acid, 1 to 2.5 oz. per gal.

Slides were shown and narrated by Mr. Du Rose. Considerable discussion followed and he was given a rising vote of thanks for a very interesting talk.

Refreshments were served — courtesy of the Harshaw Chemical Co. and the meeting adjourned at 10:00 P.M.

J. G. Sterling
Secretary and Treasurer

Pittsburgh Branch

LADIES NIGHT BANQUET

The Pittsburgh Branch of the A.E.S. held its annual Ladies Night Banquet at the Sheraton Hotel on Saturday, May 2. Approximately 250 members and guests enjoyed a delicious ham dinner after which they were entertained by a very clever group of youthful musicians.

L. J. Schmitt, Sr. presented the past president's pin to our outgoing president, *R. J. Goldbach.*

Every lady present received a useful gift. Several ladies were fortunate enough to win Westinghouse appliances as door prizes.

The evening was spent in dancing and renewing the many friendships that we have made from year to year.

Everyone present seemed to have had a pleasant evening and we all owe *Bill Wilson* and his committee a vote of thanks for their efforts in arranging a very successful party.

The Branch held its last meeting of the fiscal year on May 14.

Officers present were: *Art Kaupe, R. Goldbach, Bob Varner, R. Schindler, G. S. Woodruff, L. J. Schmitt, Sr., Ed. Washburn.*

Sixteen members enjoyed a dinner before the business meeting which started at 8 P.M. with approximately thirty-five members attending.

Bill Wilson, chairman of the Banquet Committee, was glad to report that the banquet was a success financially as well as socially. *Rex Goldbach* expressed the appreciation of the Branch to Bill and his committee for arranging a successful social affair.

The treasurer was not able to attend the meeting and as a result we were not able to obtain a last minute financial report on the Branch.

The secretary read the minutes of the executive committee meeting which was held on April 9.

We were most happy to welcome three new members into the Pittsburgh Branch. They are: *Edward A. Dantini,* Standard Steel Spring; *Frank D. Porter,* Lowe Bros. Co.; *George Karchella,* Diversey Corp.

Leo Schmitt then installed the new officers for the next year. After the installation the new president, *Ed Washburn,* took over the meeting from the very capable, now past president, *Rex Goldbach.*

New Librarian, *Myron Ceresa,* reported that his committee has chosen a list of potential speakers and that the final arrangements should be completed in the near future.

We were sorry to hear that *Bob Woofter* has been ill recently and we all wished him a speedy recovery. We were also informed that one of our most active and well liked members, *G. S. Woodruff,* is leaving the Pittsburgh district to assume new duties in the Detroit area. "Woody" will be sorely missed by all of us and our best wishes go with him.

The Librarian then introduced the speaker for the evening, *Dr. Henry B. Linford,* Dept. of Chemical Eng., Columbia University, who chose as his topic "Evaluation of Cleaning Procedures." It is quite evident that this research project is beginning to bear fruit and work that is being done will benefit all of us. Dr. Linford displayed charts and graphs which illustrated the merits of the spray evaluation method over other cleaning evaluation methods.

An interesting question period followed the speakers address and the balance of the evening was spent in a social manner.

R. H. Schindler
Secretary

Cincinnati Branch

The meeting opened with 33 men present by president *Carl F. Truman.*

The picnic committee reported that everything was all set to hold the Annual Stag Picnic at Devou Park, Covington, Kentucky on Saturday, June 27, starting at 1:00 P.M. It was moved, seconded and carried that the Dayton, Louisville, Columbus and Indianapolis Branches be consulted on the possibility of having regional Annual Education Session and Dinner Dance. President Truman instructed *Mr. Loveless* to write the various branches inviting them to a meeting to discuss the regional affair. Truman instructed the secretary to write *Charles Wise,* the retiring secretary a letter of thanks for a job well done. *Charles L. Wallace* made application and was accepted as a student member.

Ezra A. Blount, the editor of *Products Finishing* was introduced as the speaker of the evening. He gave a very informative and interesting talk on conditions in Japan, illustrated by colored movies he had taken during his recent stay in Japan. The meeting was followed by a social hour sponsored by the Gil-Ron Products Co. of Cleveland.

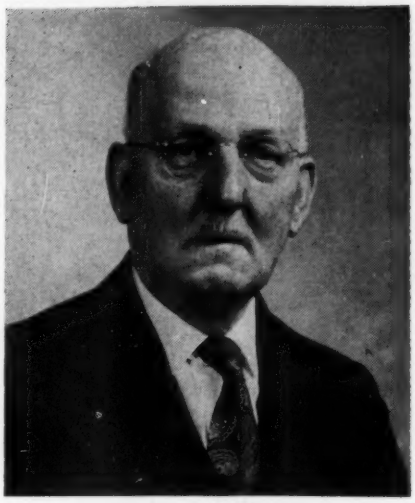
William Young
Secretary Cincinnati Branch

Hogaboom Receives "Order of the Pot"

George B. Hogaboom, who needs no introduction to those in the plating field, has received an additional honor, this one from the New England branches of the American Electroplaters' Society.

George received the "Order of the Pot," which is an award made only to past presidents of the A.E.S. The silver plating on the "Pot" and the engraving, which reads "First President American Electroplaters' Association," were done by the International Silver Co. without cost, in recognition of his association with them. The presentation was made by *Arthur Logozzo*, also a past president of the A.E.S.

We are sure we speak for the entire industry in saying "Congratulations and keep up the good work" to the Dean of American platers.



George B. Hogaboom

Chicago Branch

Chicago's May 8th meeting brought *Ed Rinker*, technical director of *Sel-Rex Precious Metals, Inc.*, who read a paper on new techniques in bright gold plating. Mr. Rinker described a new gold plating bath which has greater stability, no nodular build-up on high current density areas and better metal distribution with less metal. One hundred Chicago members paid close attention to the presentation and afterwards examined many sample articles which had been plated with this new process.

The membership committee under *Elmer Olson* continued their high rate of productivity by announcing five additions to Chicago's rolls. The following were elected to active membership:

Jerome Kuderna, Scientific Control Laboratories; *Jack Leichti*, Wagner Bros., Inc.; *Christopher Marzano*, Argonne National Laboratories; *John C. Duke*, Perfection Heat Treating Co.; *Dan A. Zarlenga*, Greenduck Novelty Co.

President *Joe Andrus* read a letter from *Ernie Lyons, Jr.*, former Chicago Branch member, who announced completion of his studies for his Ph.D. degree. Ernie is now a professor at Principia College at Alton, Illinois, where he is teaching electrochemistry. The original research done to earn his degree concerned electronic shells on metal ions and their relationship to plating bath efficiency.

"THEY WERE THERE"

Doc Monaweck recently moved to one of Chicago's tonier suburbs, Riverside, Ill. — *Fran Lanz* now directing his extra energies toward civic improvement as a trustee for the village of Riverside — good to see *Charlie Clindinin* of Crown Rheostat again — Chicago Branch meetings continue to attract a goodly share of out-of-town visitors, among them *Dick Aikin* and *Lou Ragne* of Roth Plating in South Bend, *A. S. Brumm* of Kuehne Mfg. in Mattoon, and *Deane Smith* of American Plating in Des Moines — We helped Deane buy a derby hat which he informs us is the style in Des Moines for cutting the lawn — *Paul Glab* is now driving a Cadillac and has challenged the board of managers to audit his books — Paul insists that he bought it from the proceeds of his last raise as branch secretary — The height of sound competitor relationships was noticed when *Ralph Belke* and *George Stutz, Jr.*, arrived arm-in-arm, ate dinner together and left the same way — they're also neighbors in Lincolnwood — *Jimmy August* of Promat made an early appearance — *Ed Ruzicka* of Appleton Electric relieved of picket duty — the *Kocour* brothers, *Orv* and *Les*, in attendance — *Tom Fallbacher* of W. D. Allen Mfg. taking over where *Dick Guetzow* left off — *George Duncan* of Solvox Mfg.

and *Bill Barron* of Lyons Band Instrument — *Art Bartmann* of Bell & Howell — *Al D'Anna* of Yale Polishers & Platers — *E. W. Griese* of Metalcraft and *C. R. Silhavy* of Tuttle & Kift — *Ken Edstrom* of Mall Tool and *R. H. Fisher* of Arrow Plating.

INSTITUTE OF METAL FINISHING

The International Conference on Electrodeposition and Metal Finishing, sponsored by the International Council for Electrodeposition, of which body the Institute of Metal Finishing (Great Britain) and the American Electroplaters Society (U.S.A.) are prominent members, will take place in, or near, London in April 1954. Plans are being made actively to this end by appropriate Committees appointed by the International Council.

The Technical Sub-Committee of the Conference Committee now invites authors to submit manuscripts which will be considered by the Publications Committee of the Institute of Metal Finishing for presentation at the Conference.

Papers should preferably deal with work of an original nature in the field of Electrodeposition and Metal Finishing generally. Manuscripts should be forwarded to the Honorary Secretary of the Institute of Metal Finishing, Dr. S. Wernick, at 32, Great Ormond Street, London, W.C.1.

COPPER & BRASS RESEARCH ASSOCIATION

Richard C. Diehl, president of *Chase Brass & Copper Co., Inc.*, Waterbury, Conn., has been elected president of the *Copper & Brass Research Association*, New York, at the 31st Annual Spring Meeting of the Association held recently at The Homestead, Hot Springs, Va. He succeeds *William M. Goss*, executive vice president of Scovill Mfg. Co., also of Waterbury.

Richard C. Diehl

Mr. Diehl became president of Chase, a subsidiary of Kennecott Copper Corp., September 22, 1950. Prior to becoming president of Chase, he spent his entire career in the steel industry. He was born in Defiance, Ohio and is a graduate of Ohio State University with the degree of Bachelor of Metallurgical Engineering. He spent seven years with Armco Steel Corp. at its Butler, Pa. and Middletown, Ohio plants. He then went to the Wheeling Steel Corp. where he was employed for 15 years, resigning as general manager of its Steubenville, Ohio plant to become president of Chase. He is a member of the American Iron and Steel Institute and the Association of Iron and Steel Engineers. Mr. Diehl is a Mason and an Elk.

The following vice-presidents were elected: *J. A. Doucett, A. R. Zender, M. F. Meissner, E. S. Strang, F. W. Sullivan, W. W. Sieg* and *F. R. Slagle. A. G. Wentworth* was elected treasurer. *T. E. Veltfort* was re-elected manager and *Bertram B. Caddle* was re-elected secretary. These officers with Mr. Diehl will constitute the Board of Directors.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS

The thirty-third and thirty-fourth local sections of the *National Association of Corrosion Engineers* have been added in the rapidly expanding industrial region of the Pacific Northwest. The association's Western Region board of trustees has approved formation of the Columbia River Basin Section and the newly organized NACE Canadian Region has approved formation of a British Columbia Section at Vancouver.

Mark Adams of the State College of Washington will organize the Columbia River Basin Section. The new Canadian Section is the third to be organized in Canada this year.

The National Association of Corrosion Engineers now has more than 4,300 members in the United States and abroad and has been growing at a rate of about 20 per cent a year for the past three or four years.

NEWS FROM CALIFORNIA

(*Concluded from page* 101)

At the conclusion of Mr. Bowen's talk, a sound color film was shown, entitled "Corrosion In Action," which presented a graphic explanation of how corrosion acts to cause an annual loss of more than six billion dollars, and how this damage can be avoided and controlled. The film was prepared by the Corrosion Engineering Section of *International Nickel Co., Inc.*

Starting in Mid-May, various technical service engineers attached to the *L. H. Butcher Co.'s* west coast operations traveled to the home plant of the *Udilyte Corp.* and its subsidiaries for factory, laboratory and engineering refresher courses to indoctrinate them in new developments and projects of the parent company.

The first of several groups of L.H.B. men who will undergo the traning during the summer left in May, and included the following: *Irving Halpern*, chief chemist, and *Don Fish*, *Dean Williams*, *David Althouse* and *Frank Virgil* from the Los Angeles office; *Floyd Browing* and *Rice Coen* from San Francisco; *Floyd Sharts* and *Ken Humphries* of Portland, Ore. The three weeks training course includes actual work in the Udilyte plant at Detroit, as well as in the laboratory and engineering departments. Then the men are sent for similar indoctrination periods to the plant of *Roto Finishing Corp.* in Kalamazoo, Mich., and *Frederick B. Stevens, Inc.*, Detroit.

Southern California sales offices of the *Permutit Co.* of New York, have been moved to 302-B Brand Blvd., Glendale, Cal. Facilities for sales and distribution of the company's line of industrial and household ion exchange equipment and resins for water conditioning applications are part of the new Glendale set-up.

Free Course in Electroplating

The Fall term in Electroplating at the *Brooklyn Evening Technical High School*, 29 Fort Greene Place, Brooklyn 17, N. Y., begins September 16, 1953. Laboratory experiements include analyses of copper, nickel, chromium and silver baths. Additional laboratory work provides the opportunity to perform Hull cell experiments, pH meter operation, thickness measurement by chemical methods of zinc, cadmium, nickel, chromium. Classroom discussion covers such topics as a review of the fundamentals of elementary chemistry, tank area calculations, specific gravity and Baume readings, wetting agents, brighteners, buffer agents, pitting.

Registration begins September 14, 1953 and daily thereafter from 7:00 to 9:00 P.M. Classes meet Tuesday and Thursday nights, 6:45 to 8:15 P.M., plus about 6 Friday nights during the term. The term begins September 16, 1953 and ends January 29, 1954. Ask for Mr. L. Serota in room BW17 or 3E12.

PATENTS

(*Concluded from page* 77)

Descaling Iron and Steel

U. S. Patent 2,632,718. *March* 24, 1953. *N. H. Brodell, assignor to William Isler.*

In a method of descaling ferrous metal articles, the steps which consist in immersing the articles in a solution of a compound selected from the group consisting of completely oxidized polyvalent metallic halides and aliphatic and aromatic polyhalides to form a coating of said compound on said article, then heating the articles to a temperature such that a chemical change in the coating loosens the scale on said articles, and then quenching the articles in a solution of a compound which breaks the scale away from the articles.

Ammonium Chromate Rinse for Phosphate Coated Metal Surfaces

U. S. Patent 2,634,225. *April* 7, 1953. *H. J. Benzing, assignor to American Chemical Paint Co.*

In the art of finishing ferriferous and zinciferous metal surfaces, the method which includes producing on the surface a crystalline phosphate coating by chemical reaction with the metal, rinsing the coated surface with an aqueous solution containing as its essential ingredients for each 100 gallons of solution from 1 to 40 ounces of chromate expressed as CrO_3 and a quantity of ammonia sufficient to yield a pH which is high enough to preclude the presence of free chromic acid, said rinsing solution being kept substantially free of dissolved extraneous salts, drying the rinsed surface and then applying a siccative finishing coat to the dry surface.

Rust Inhibiting Composition

U. S. Patent 2,634,237. *April* 7, 1953. *W. J. Kopf and L. C. Westcott, assignors to Shell Development Co.*

A rust inhibiting composition containing the following constituents in the following proportions:

	Per cent by weight
Pb naphthenate	0.001-2%
Pentaerythritol monooleate	0.01-5%
Mineral oil	Balance